THIRD ASSESSMENT OF WATER QUALITY IN THE SUSQUEHANNA RIVER BASIN

SUSQUEHANNA RIVER BASIN COMMISSION

RESOURCE QUALITY MANAGEMENT & PROTECTION DIVISION

OCTOBER 1987

The Susquehanna River Basin Commission was created as an independent agency by a Federal-Interstate Compact* among the States of Maryland, New York, Commonwealth of Pennsylvania and the Federal Government. In creating the Commission, the Congress and State Legislatures formally recognized the water resources of the Susquehanna River basin as a regional asset vested with local, State and National interests for which all the parties share responsibility. As the single Federal-Interstate water resources agency with basinwide authority, the Commission's goal is to effect coordinated planning, conservation, management, utilization, development and control of basin water resources among the government and private sectors.

* Statutory Citations: Federal - Pub. L. 91-575, 84 Stat. 1509 (December, 1970); Maryland - Natural Resources §8-301 (Michie 1974); New York - ECL §21-1301 (McKinney 1973); and Pennsylvania - 32 P.S. 820.1 (Supp. 1976).

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SUMMARY AND CONCLUSIONS

Most of the streams in the Susquehanna River Basin have good water quality and support healthy biological communities composed of a diversity of aquatic plants (algae and macrophytes), invertebrates (zooplankton, aquatic insects, crustaceans and others) and fish. The streams are suitable for designated uses such as fishing, swimming and boating. However, there are also many miles of streams with degraded water quality.

The most serious water quality problem in the Basin results from acid mine drainage. Acid mine drainage originates from surface water seeping through coal mines and culm piles. Without proper treatment, this water carries high concentrations of acid, heavy metals and other dissolved solids into streams. Mild pollution by acid mine drainage will eliminate all but the most hardy forms of aquatic life. Heavy pollution by acid mine drainage renders streams virtually lifeless.

A majority of the streams impacted by acid mine drainage in the Basin are located in the West Branch Subbasin. Coal deposits underlie much of the western half of this Subbasin and mining activities have been going on for over a century. The West Branch Susquehanna River is degraded for 121 miles of its 250 mile length. Tributaries degraded by acid mine drainage include Clearfield Creek, Moshannon Creek, Sinnemahoning Creek and hundreds of smaller streams.

Acid mine drainage also degrades streams in the anthracite region on the eastern edge of the Basin. Most of these streams are in the Scranton-Wilkes-Barre area and the Shamokin-Hazleton

area. Streams degraded in these areas include the Lackawanna River, Nescopeck Creek, Catawissa Creek, Shamokin Creek, Mahanoy Creek and other smaller streams. Streams degraded by acid mine drainage in other parts of the Basin include the upper reaches of the Tioga River and Loyalsock Creek, and the lower half of Schrader Creek.

Abatement of acid mine drainage pollution has been accomplished on some streams through reclamation and other treatment programs. However, due to the extent of the problem and the paucity of funding, abatement of acid mine drainage pollution will continue to be slow.

Municipal and industrial discharges, major sources of pollution in the past, have been aggressively regulated by the state agencies over the past 15 years. Through permitting of discharges and construction of sewage treatment plants, the degradation caused by these discharges has been greatly abated. Water quality in many streams has improved dramatically over the past 20 years. Some stream reaches still are degraded due to these sources but the widespread degradation that once plagued many of the larger streams in the Basin is now rare.

Another current problem affecting water quality in the Basin stems from non-point source pollution. These problems are due to erosion and agricultural runoff and have their most serious impact in the heavily developed areas in the southern part of the Basin. They contribute to nutrient enrichment problems in impoundments on the lower river and in the Chesapeake Bay. Management policies directed towards this problem are receiving increased emphasis from resource agencies.

The Susquehanna River has very good water quality for most of its length. The effects of pollution loads can be observed downstream of Binghamton, New York (industrial and municipal loads) and Wilkes-Barre, Pennsylvania (municipal and acid mine drainage loads). However, these effects are not serious and water quality of the Susquehanna River rebounds quickly. The lower Susquehanna River holds three impoundments that cause dissolved oxygen problems during summer low flow periods.

Of the major tributaries to the Susquehanna River (those with drainage areas greater than 1000 square miles), only the Juniata River is nearly free of serious degradation. The West Branch Susquehanna River, Sinnemahoning Creek and the Tioga River have extensive water quality degradation due to acid mine drainage. Abatement projects have improved water quality in some reaches but others remain to be restored. The Chemung River has good water quality for most of its length. However, municipal sewage from Elmira, New York degrades water quality throughout a reach that extends downstream into Pennsylvania. The Chenango River also has good water quality for most of its length, but suffers degradation due to inadequately treated sewage near Norwich and Hamilton.

Streams having drainage areas greater than 300 square miles are represented on Figure 1. More detailed information on these streams and smaller tributaries is presented in the body of this report.

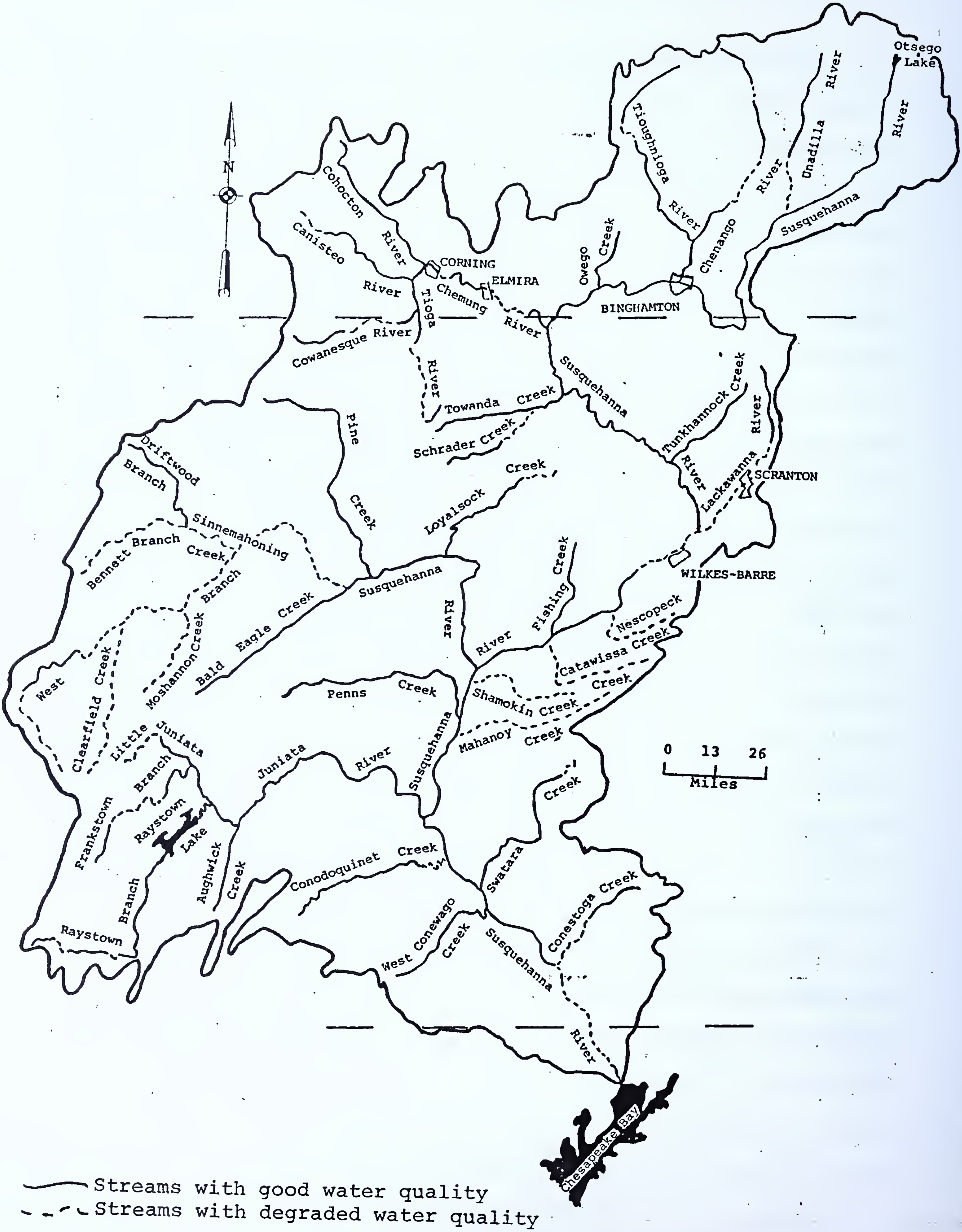


FIGURE 1 - WATER QUALITY OF STREAMS IN THE SUSQUEHANNA RIVER

INTRODUCTION

This report is the third assessment of the quality of surface waters in the Susquehanna River Basin. Two previous assessments were published in the late 1970's by the Susquehanna River Basin Commission (SRBC) (Rudisill 1976, 1979). Water resources in the Basin are managed by the states of New York, Pennsylvania and Maryland, federal agencies (such as the Corps of Engineers and the Environmental Protection Agency) and numerous municipal and private interests. The SRBC was established to provide for the management and proper development of the water resources in the Basin. This document is part of that comprehensive oversight.

METHODOLOGY

Information for this report was gathered primarily from two sources. The first source of information is a set of stream surveys conducted between 1982 and 1985 by SRBC staff. These stream surveys were conducted to assess water quality and biological conditions in the Basin. Reports describing the results of these stream surveys have been published for each of the six major subbasins (Malione, et.al., 1984; McMorran, 1985a, 1985b, 1985c, 1986a, and 1986b).

The second major source of information is the biennial 305(b) reports published by Maryland (MdDNR, 1986), New York (NYDEC 1980, 1982, 1984, 1986) and Pennsylvania (PaDER 1984, 1986). These reports are part of the requirements for the Clean Water Act and give descriptions of streams where designated water

uses are impaired. Other reports published since 1978 were also used to update information presented by Rudisill (1979).

BASIN GEOGRAPHY

The Susquehanna River Basin drains an area of 27,580 square miles. Most of this area is within Pennsylvania (76%), followed by New York (23%) and Maryland (1%). The Susquehanna River Basin is the largest river basin on the Atlantic coast of the United States. The Susquehanna River originates at the outlet of Otsego Lake in Otsego County, New York. The river flows 450 miles through New York, Pennsylvania and Maryland into the Chesapeake Bay at Havre de Grace, Maryland (Figure 2).

The geomorphic makeup of the Basin includes five physiographic provinces: Appalachian Plateau, Valley and Ridge, Piedmont, Blue Ridge and Atlantic Coastal Plain. The New York and northern Pennsylvania areas of the Basin lie within the Appalachian Plateau Province. This area covers 56 percent of the Basin, and is characterized by steep, high hills that rise 500 to 800 feet above deep U-shaped valleys. This area is underlain by shale, limestone, sandstone and bituminous coal.

The boundary between the Appalachian Plateau Province and the Valley and Ridge Province is a steep escarpment known as the Allegheny Front. The Valley and Ridge Province is characterized by long, narrow ridges, with heights ranging from 500 to 1,600 feet, separated by wide valleys. This is the result of alternating layers of hard and soft sedimentary rock that have undergone folding under great pressure. This province covers 37

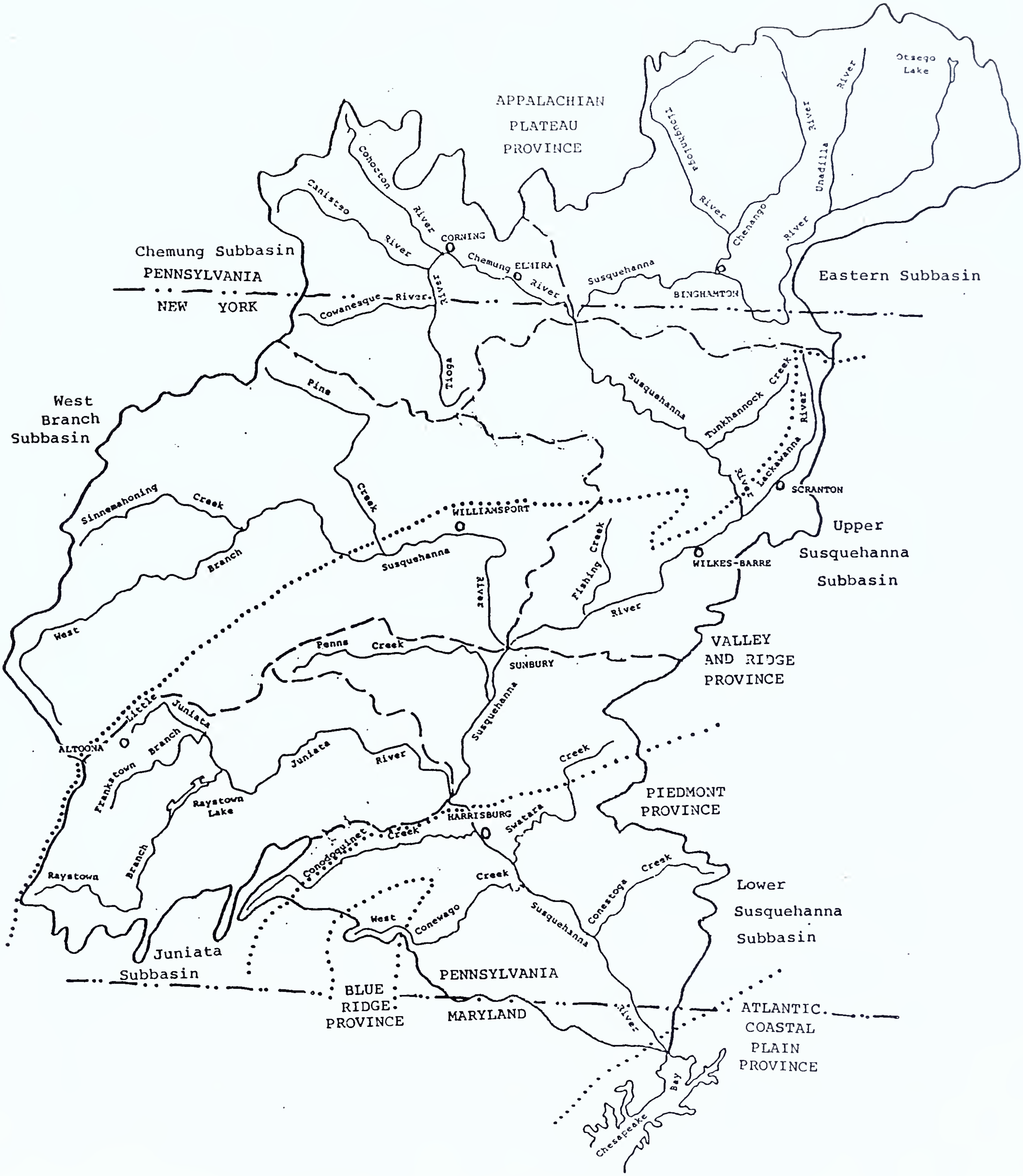


FIGURE 2 - SUSQUEHANNA RIVER BASIN

percent of the Basin area. The eastern portion of this province contains anthracite coal fields.

South of the Valley and Ridge Province lies the Piedmont Province. This province occupies seven percent of the Basin by area. It is characterized by wide valleys and low relief (400 to 600 feet).

The very southern end of the Basin, where the Susquehanna River enters the Chesapeake Bay and occupying less than one percent of the Basin's area, is the Atlantic Coastal Plain Province.

The Blue Ridge Province extends into the Basin as a prong in Cumberland and Adams counties, Pennsylvania. This is an area of high relief with maximum altitudes reaching 2,200 feet. It also occupies less than one percent of the Basin's area.

The population of the Basin was approximately 3.6 million in 1980. The major population centers are around Harrisburg, York and Lancaster in southern Pennsylvania; Scranton and Wilkes-Barre in northeastern Pennsylvania; and Binghamton in southern New York. Smaller cities include Elmira, Corning, Cortland and Oneonta, New York; and Williamsport, Lebanon, Hazleton, Altoona, State College and Sunbury, Pennsylvania. The most densely populated areas of the Basin are the southern central portions of the Lower Susquehanna Subbasin. The most sparsely populated areas are in the West Branch Subbasin.

Land uses vary with terrain. The more rugged and mountainous areas are undeveloped and remain largely forested, while the flatter areas have been developed for agriculture.

Coal mining is extensive in the western and eastern parts of the Basin.

EASTERN SUBBASIN

The Eastern Subbasin includes that area of the Basin drained by the Susquehanna River upstream of its confluence with the Chemung River (Figure 3). Of this 4,933 square mile area; 4,513 square miles are in New York, and 420 square miles are in Pennsylvania. Major streams include the Susquehanna River, the Chenango River, the Tioughnioga River and the Unadilla River. Population centers include Binghamton, Johnson City, Endicott, Oneonta and Cortland; however the subbasin is predominately rural.

The source of the Susquehanna River is Otsego Lake, found in Otsego County, New York at Cooperstown (Figure 4). Otsego Lake is the largest natural lake in the Basin. It is a deep, cold-water lake and holds several species of fish (lake trout, whitefish, ciscoe, smelt and burbot) that are not common elsewhere in the Basin. Otsego Lake has excellent water quality and is a unique natural feature of the Basin. The excellent water quality is due to the relatively undeveloped nature of the lake's watershed. However, recent studies (NYDEC, 1986) show moderate impairment of water supply uses due to pollution originating from increased development of the lake's shoreline.

The Susquehanna River (Figure 4) between Cooperstown and Sidney has good water quality (McMorran, 1985c). Impacts on water quality are present downstream of Cooperstown and Oneonta due to sewage discharges and other point and non-point sources.

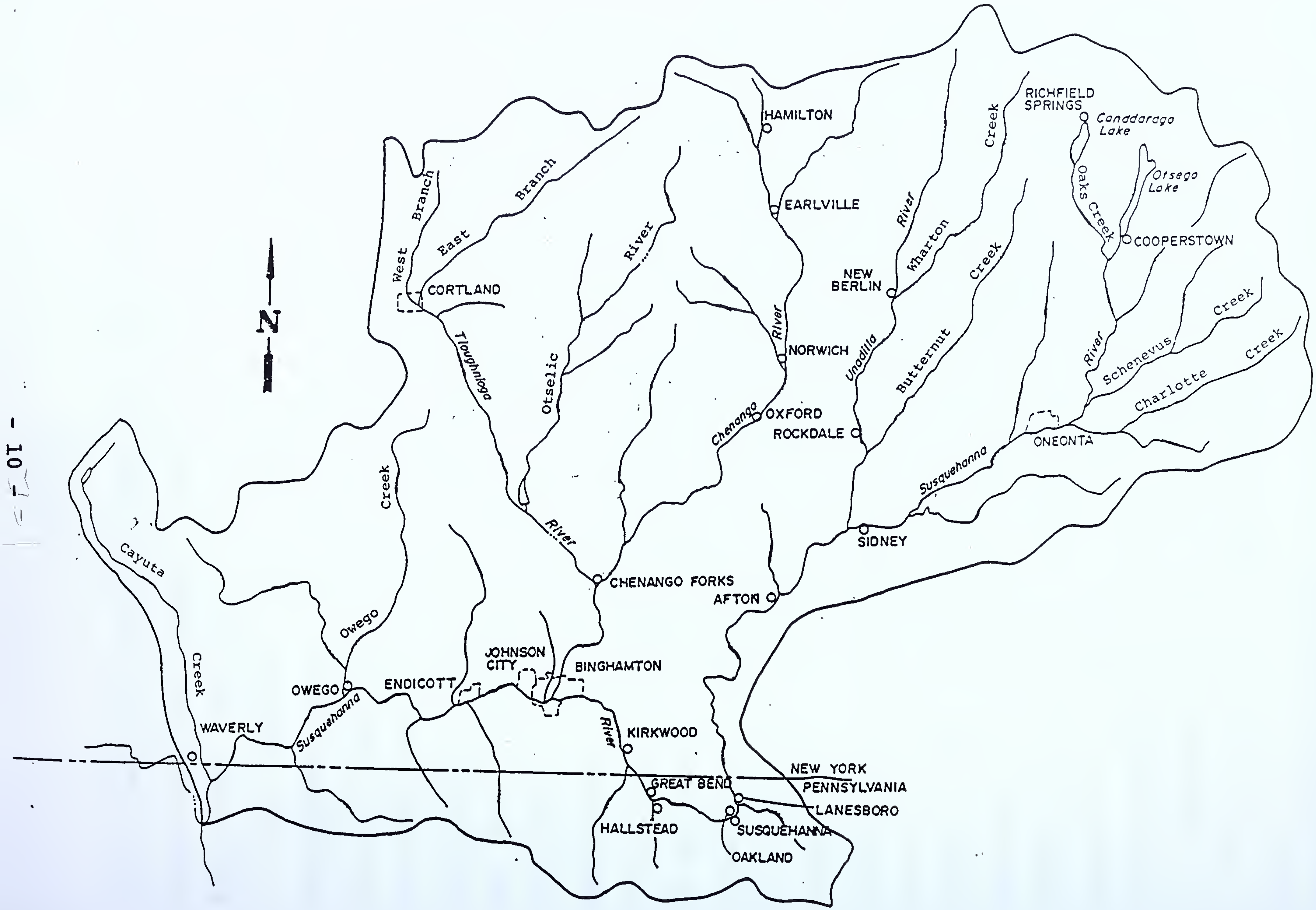


FIGURE 3 - EASTERN SUBBASIN

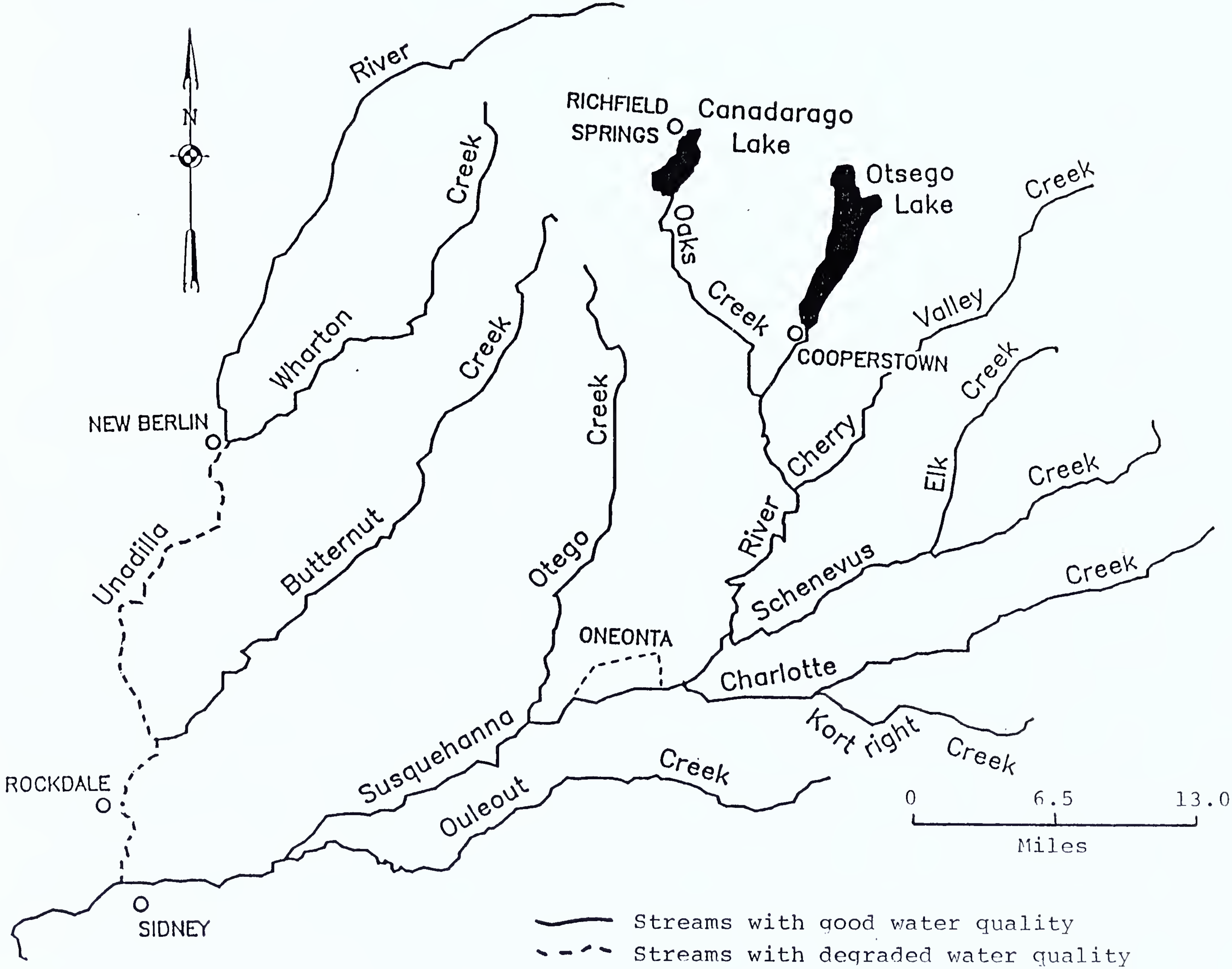


FIGURE 4 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED UPSTREAM OF THE UNADILLA RIVER (INCLUSIVE)

These impacts are characterized by low concentrations of dissolved oxygen and high concentrations of metals. Primary contact recreation and fish propagation are impaired uses. However, diverse and abundant fish and macroinvertebrate communities are present throughout most of this reach. This diversity indicates an absence of stress due to water pollution.

Canadarago Lake is another large lake in this area (Figure 4). During the mid 1970's, highly eutrophic conditions were present in the lake due to the sewage discharge from the Village of Richfield Springs (NYDEC, 1986). Upgrading of the sewage treatment plant (STP) in 1975 resulted in a dramatic improvement of water quality in the lake. The lake's fishery improved dramatically from a population of stunted panfish to a diverse population of bass, walleye, perch and other game and forage fish. Water quality in Canadarago Lake is very good as shown by the well balanced biological community indicating a lack of pollution stress.

Tributaries to the Susquehanna River between Otsego Lake and the Unadilla River include Oaks Creek, Cherry Valley Creek, Schenevus Creek, Charlotte Creek, Otego Creek and Ouleout Creek (Figure 4). These streams have similar water quality due to the similarity of their watersheds; rural areas consisting of farmland and forest. Few sources of pollution exist and no areas of degradation have been documented. Degraded areas, if they exist, are localized. Surveys of these streams documented healthy fish and macroinvertebrate populations, indicating that no major pollution problems were present (McMorran, 1985c). Water quality in these streams is good to excellent.

Water quality in the Unadilla River (Figure 4) ranges from fair to excellent. Low concentrations of chemical parameters and healthy fish and macroinvertebrate communities are found throughout most of the Unadilla River (McMorran, 1985c). These characteristics indicate a lack of degradation, however, impairment of swimming and other primary contact uses is indicated by high bacteria counts at Rockdale and New Berlin. Malfunctioning on-lot sewage disposal systems are the suspected cause of this problem (NYDEC, 1986).

Butternut Creek and Wharton Creek (Figure 4) have good water quality. Both streams exhibit low concentrations of chemical parameters. Healthy fish and macroinvertebrate communities indicate a lack of biological stress and are another indicator of good water quality.

The reach of the Susquehanna River between Sidney, New York and Binghamton, New York (Figure 5) is of particular interest because it flows through Pennsylvania for 18 miles. The reach between Sidney and the state line has good water quality (McMorran, 1985c). The area is rural with few discharges that impact the river. A toxic substance survey in 1981 (NYDEC, 1982) detected the presence of chloroform, trichloroethylene, tetrachloroethane and several heavy metals. The heavy metals may originate from an ash disposal site near the river in Afton. No other indications of degradation have been documented. Abundant and diverse fish and macroinvertebrate communities are also indicative of a lack of pollution stress and therefore good water quality.

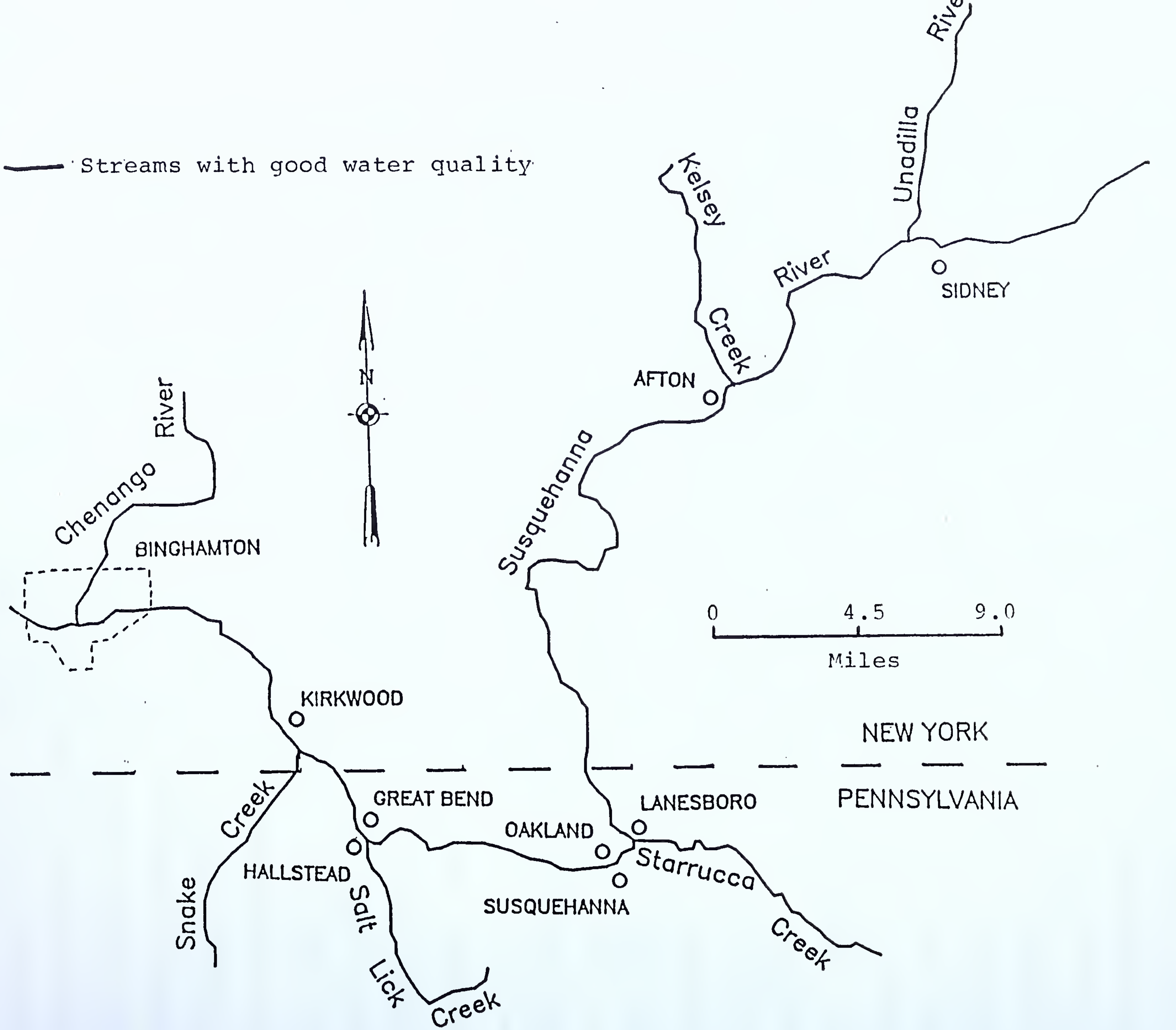


FIGURE 5 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED BETWEEN THE UNADILLA RIVER AND THE CHENANGO RIVER

The Susquehanna River in the Great Bend area has a history of water quality problems. Discharges from the communities of Susquehanna, Lanesboro, Oakland, Hallstead and Great Bend caused degradation during low flow periods as late as the 1960's (LaBuy, 1967). An STP constructed at Susquehanna and also serving Oakland and Lanesboro resolved much of this problem. Another STP is proposed for Hallstead and Great Bend. Monthly monitoring results since 1986 reveal few signs of degradation in the Susquehanna River at Kirkwood, New York (McMorran, 1987). Healthy fish and macroinvertebrate communities are evidence of the absence of water quality degradation.

However, as the Susquehanna River flows through the Binghamton area, it receives a large number of discharges. The Susquehanna River shows impacts due to combined sewer overflows and municipal and industrial discharges from Binghamton. Recent studies have detected the presence of heavy metals and various organic compounds in streams around the Binghamton area (NYDEC, 1982). Improvements in STPs at Binghamton and Johnson City are also needed. Violations of dissolved oxygen standards occur about eight times annually and fecal coliform about 26 times annually (NYDEC, 1982). However, despite these problems water quality has improved over the past 15 years.

Kelsey Creek and Salt Lick Creek are two tributaries to the Susquehanna River between the Unadilla River and Binghamton (Figure 5). These streams drain rural, predominately forested watersheds. Both support healthy fish and macroinvertebrate communities indicating a lack of pollution stress, thus good water quality (McMorran, 1985c).

Starrucca Creek (Figure 5) is listed as ammonia limited by PaDER (PaDER, 1984a). This reflects the excellent water quality of the stream. The stream habitat and a diverse benthic community support wild populations of brown and brook trout (Rider, 1985). One unnamed tributary was designated as Exceptional Value in 1983. Parts of the watershed are owned by the Nature Conservancy and include Thompson Wetlands (an area holding rare plant and animal species) and a scenic waterfall.

Snake Creek (Figure 5) had indications of low dissolved oxygen levels during 1984 (McMorran, 1985c). However, monthly monitoring results begun in 1986 have not shown any problems relating to dissolved oxygen (McMorran, 1987). Snake Creek has good water quality characterized by low concentrations of chemical parameters. Minor problems relating to agricultural runoff may be occurring as indicated by intermittently high levels of fecal bacteria.

The Chenango River (Figure 6) is the largest tributary to the Susquehanna River in the Eastern Subbasin. Although the watershed is predominately rural, several communities cause local water quality degradation. Near its headwaters, the Chenango River receives degraded waters from Payne Brook (NYDEC, 1984). Payne Brook experiences seasonal water quality degradation at the STP discharge from the Village of Hamilton. This occurs when classes are in session at Colgate University and the sewage generated by the increased student population exceeds the design capacity of the STP. The overloading of the STP results in lowered dissolved oxygen concentrations (approaching 0 mg/l under

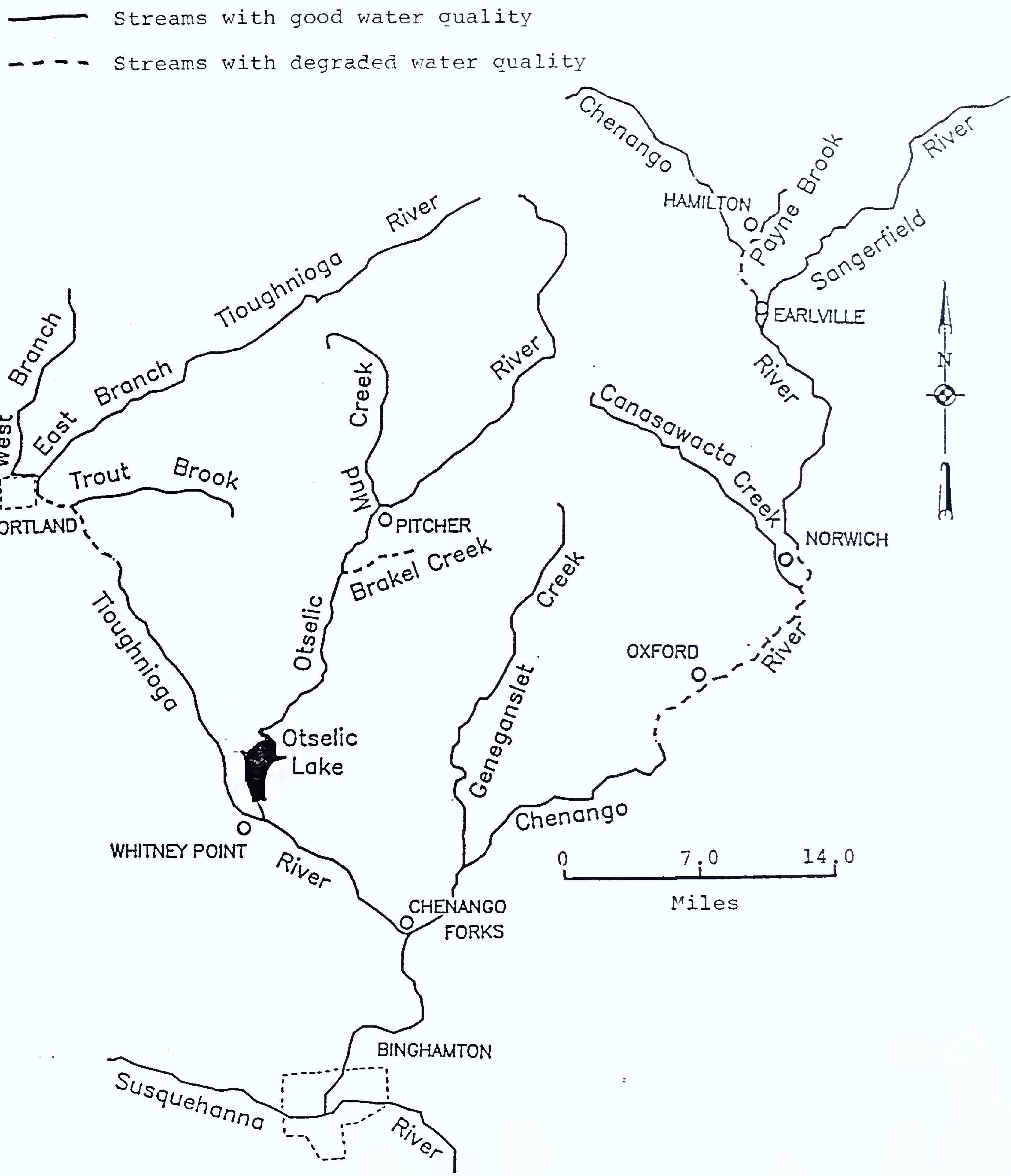


FIGURE 6 - WATER QUALITY OF THE CHENANGO RIVER WATERSHED

high temperatures and low flow), high suspended solids and high ammonia concentrations in Payne Brook. Organic enrichment is also indicated by the response of the macroinvertebrate community: low diversity, high numbers of pollution tolerant organisms and reduced numbers of pollution sensitive organisms. This degradation carries into the Chenango River resulting in a greater degree of use impairment due to its higher classification. The Hamilton STP is being upgraded. This temporarily worsens the problem due to the shutdown of the plant components being improved. When construction is completed, the STP will be able to handle the waste load entering it and the present degradation will no longer occur.

Fortunately, water quality in the Chenango River rebounds a few miles downstream from Payne Brook. The Chenango River receives good quality water from the Sangerfield River at Earlville and maintains good water quality downstream to Norwich (McMorran, 1985c). At Norwich, degradation occurs due to discharges from several industries and the Norwich STP (NYDEC, 1985). The STP at Norwich is inadequate and is in need of upgrading. Consequently, the Chenango River is severely stressed for ten miles between Norwich and Oxford.

The Chenango River recovers downstream of Oxford (McMorran, 1985c), but is presently hindered by the village's inadequately treated wastes. The Village of Oxford is initiating the construction of an STP and the successful completion of this project will improve water quality in the Chenango River. At present, slow recovery occurs downstream to Chenango Forks. Good

quality water entering from Geneganslet Creek assists this recovery (McMorran, 1985c).

At Chenango Forks, the Chenango River joins with its largest tributary, the Tioughnioga River. The Tioughnioga River (Figure 5) is degraded near Cortland, which has a large discharge to the river from its STP (McMorran, 1985c). Nutrients and solids cause a dissolved oxygen sag downstream of Cortland during low flow periods. Fecal coliform levels are also high near Cortland.

These effects are temporary and the Tioughnioga River has good water quality for most of its length. It receives good quality water from Trout Brook and the Otselic River before entering the Chenango River. One tributary to the Otselic River, Brakel Creek is degraded. Brakel Creek is severely impaired for fish propagation due to sewage from a state correctional facility (NYDEC, 1986).

The Chenango River receives a number of urban discharges as in enters Binghamton near its confluence with the Susquehanna River. The Chenango River receives sewer overflows and municipal and industrial discharges. These discharges have impacts but the quality of the Chenango River at its confluence with the Susquehanna River is good (McMorran, 1985c; NYDEC, 1986).

Downstream of Binghamton, the Susquehanna River is impacted by discharges from Endicott and Owego, and by non point sources (Figure 7). However, water quality continues to recover downstream and is good to the New York-Pennsylvania state line (McMorran, 1985c).

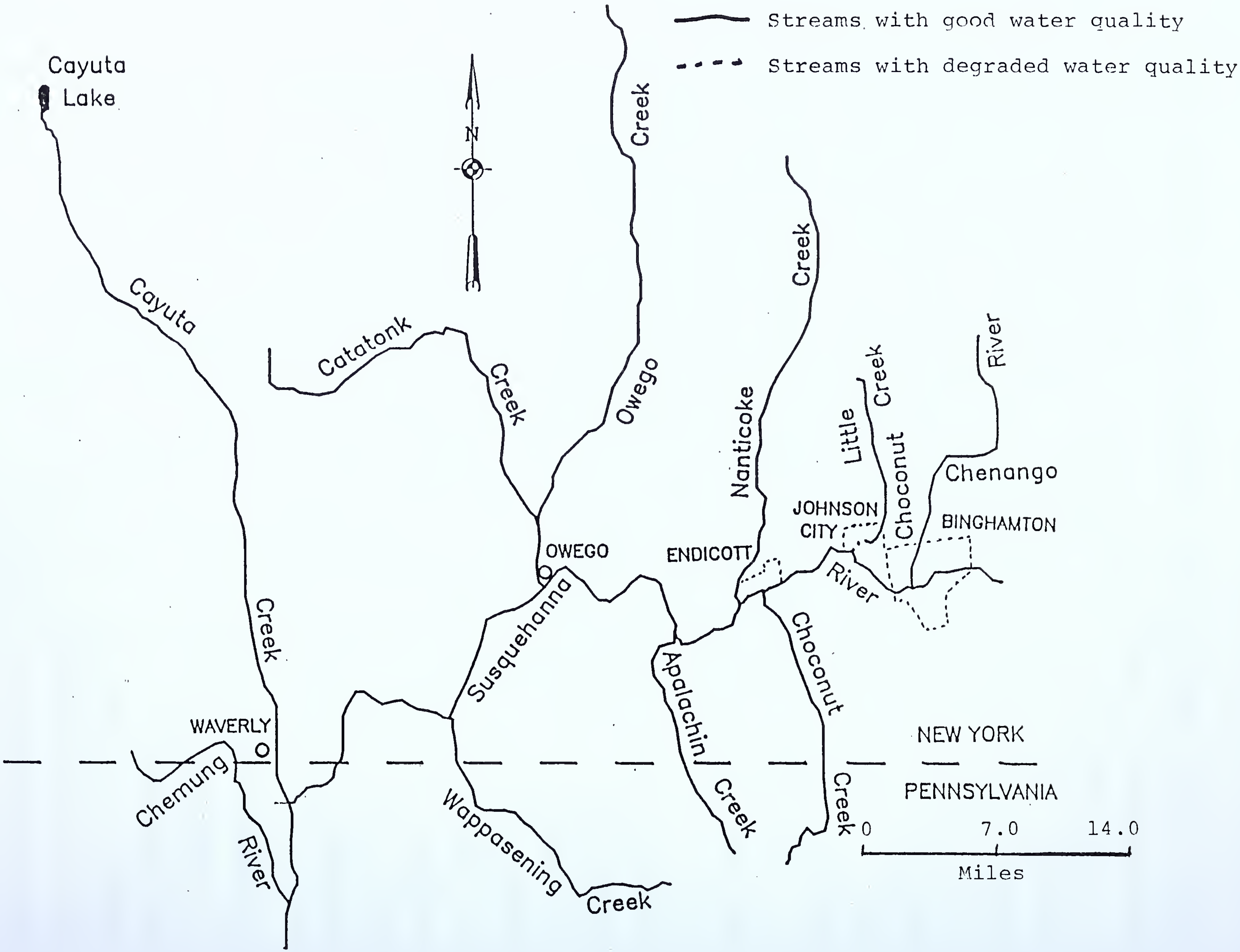


FIGURE 7 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED BETWEEN THE CHENANGO RIVER AND THE CHEMUNG RIVER

Tributaries in the reach between Binghamton and Waverly (Figure 7) have good water quality. Nanticoke Creek, Choconut Creek, Apalachin Creek, Owego Creek, and Wappasening Creek have no documented water quality problems (McMorran, 1985c). Biological sampling found diverse and abundant fish and macroinvertebrate communities thus indicating a lack of pollution stress. The lower mile of Little Choconut Creek experiences severe impairment of most uses due to a thermal discharge from the Goudey Station power plant (NYDEC, 1986).

Cayuta Creek (Figure 7) has been intensively studied (LaBuy, 1967; Malione, et. al., 1984; McMorran, 1985c): from its source at Cayuta Lake downstream to Waverly (30 miles), it has excellent water quality. A discharge from a dairy products plant in Waverly degraded the lower two miles of Cayuta Creek in Pennsylvania. Beginning in 1982, the discharge from the dairy products plant was treated by the newly built Waverly STP. A diverse and abundant fish and macroinvertebrate community has reestablished itself in Cayuta Creek in response to the improved water quality.

CHEMUNG SUBBASIN

The Chemung Subbasin (Figure 8) includes areas drained by the Chemung River and its tributaries the Tioga River, the Cohocton River, the Canisteo River and the Cowanesque River. Water quality in the Chemung Subbasin is good. Most streams meet the designated uses of fishable and swimmable waters. However, several water pollution problems exist.

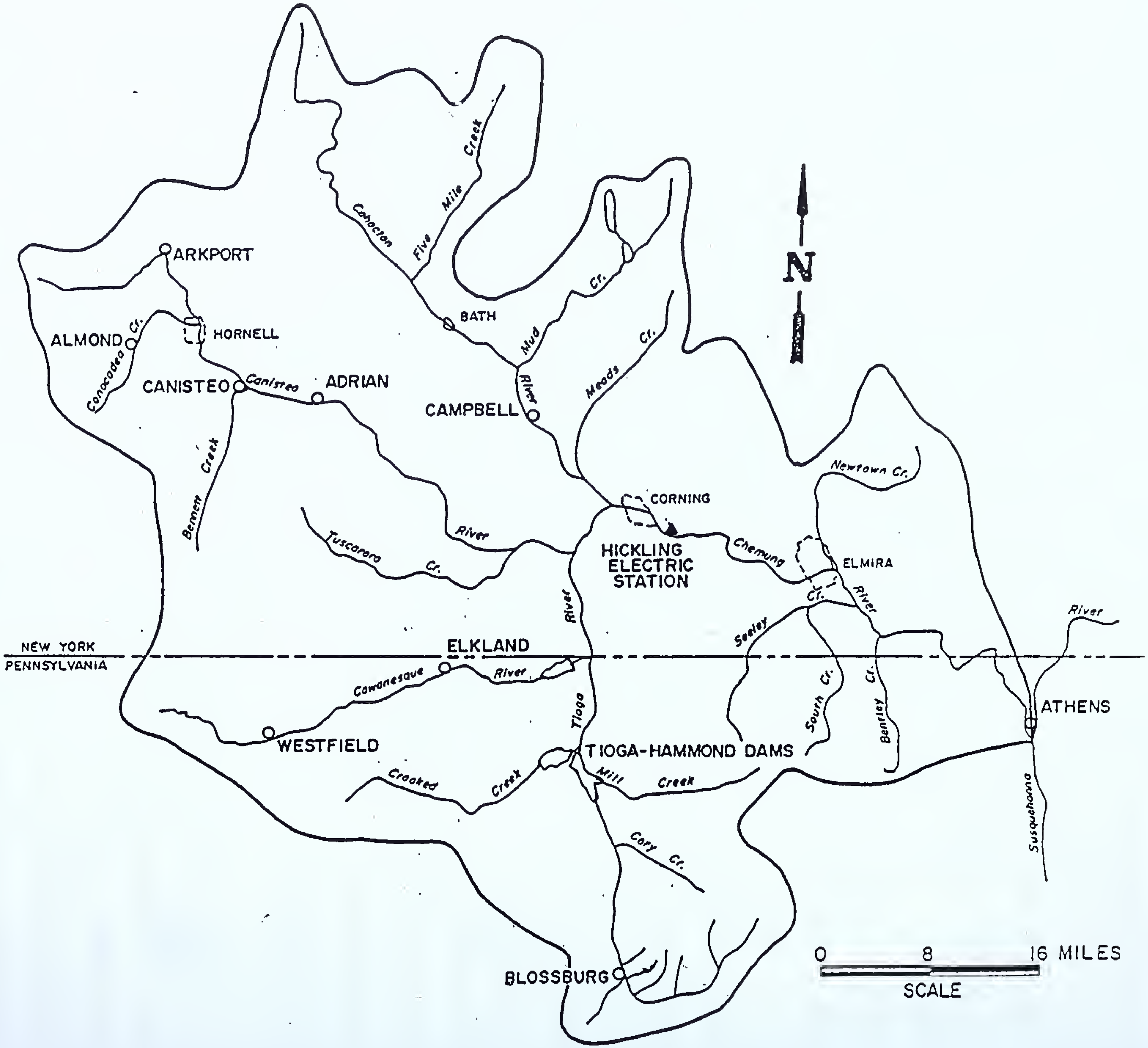


FIGURE 8 - CHEMUNG SUBBASIN

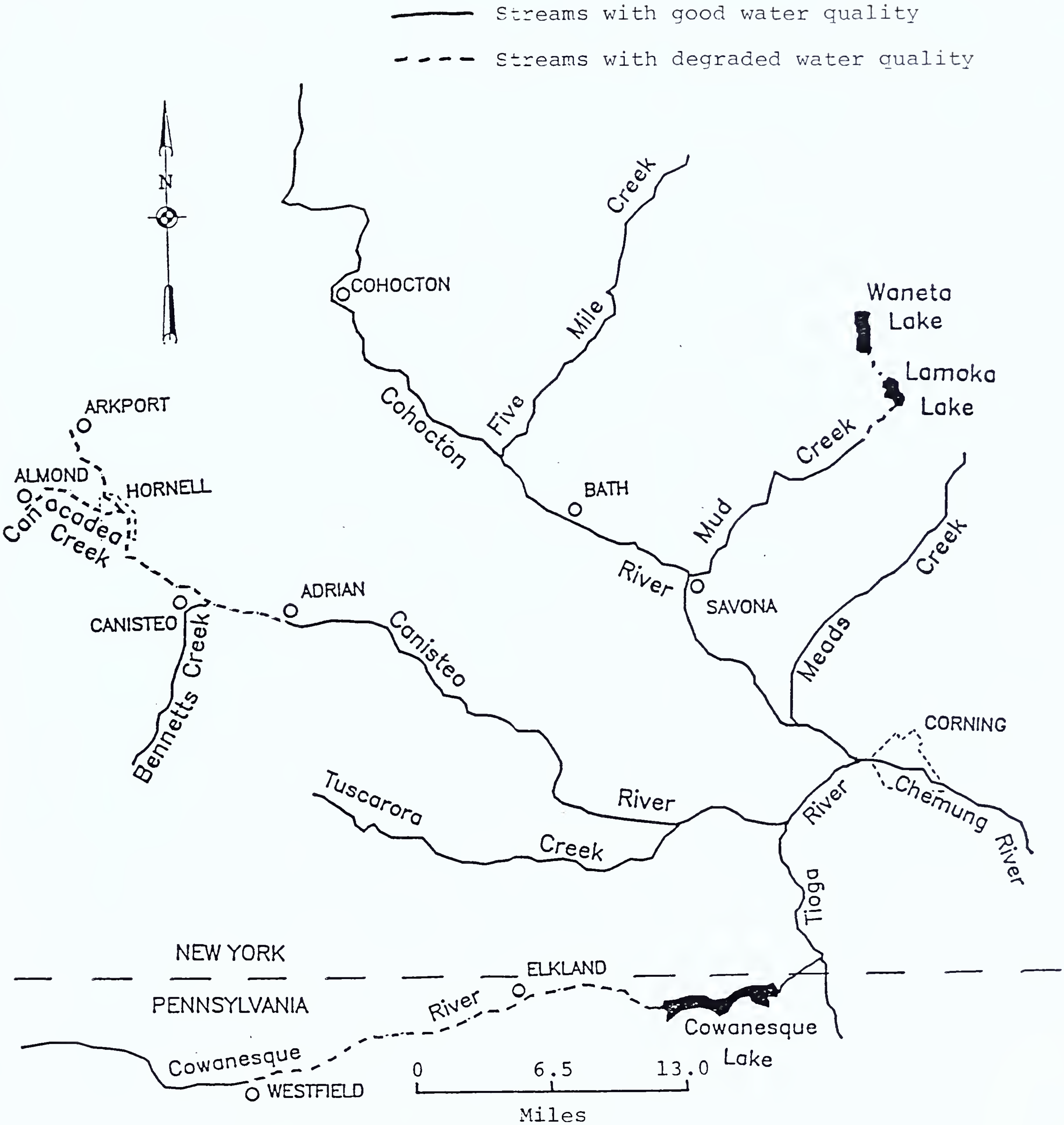


FIGURE 9 - WATER QUALITY OF THE CANISTEO RIVER, COHOCTON RIVER AND COWANESQUE RIVER WATERSHEDS

The Cowanesque River (Figure 9) has excellent water quality in its headwaters west of Westfield, Pennsylvania. Until 1983, severe water quality degradation occurred in its middle reaches due to sewage discharges from Westfield and Elkland, and from a tannery discharge at Westfield (PaDER, 1984c). The Cowanesque River recovered from this degradation downstream to its confluence with the Tioga River. Significant improvement occurred in this middle reach by 1983 due to improvements in the quality of the discharges in Westfield and Elkland. However, failure of on-lot disposal systems, overloading of STPs, agricultural runoff, and other non-point sources still affect the quality of this reach.

The lower reach of the Cowanesque River is now the site of Cowanesque Lake. This impoundment is a COE project providing flood protection, recreation and water storage. The lake changes the water quality and biological composition of the river due to the shift from a lotic to a lentic environment. However, these changes do not result in any major impacts on water quality and the Cowanesque River contributes good quality water to the Tioga River (Bieber, 1984).

The Canisteo River (Figure 9) exhibits water quality impairment in its headwaters near Hornell, Almond, Arkport and Canisteo (McMorran, 1985b; NYDEC, 1981b). Water quality problems in the Canisteo River and Canacadea Creek are due to sewage and industrial discharges, erosion, and sedimentation. Improvement has occurred recently, but problems still persist.

The Canisteo River recovers from this degradation downstream to Adrian. Good quality water received from Bennett Creek assists this recovery. The middle and lower reaches of the Canisteo River flow through relatively undeveloped forested and agricultural areas. Tuscarora Creek and smaller tributaries are sources of good quality water and have a beneficial impact on the quality of the Canisteo River. Tuscarora Creek is the only large tributary to the lower reach of the Canisteo River. Healthy fish and macroinvertebrate communities are indicative of good water quality.

The Cohocton River (Figure 9) drains large areas where agriculture is the major land use. Runoff and infiltration from this type of land use on productive soils result in a very productive stream (NYDEC, 1981b). Dense beds of aquatic weeds and plants and high densities of aquatic invertebrates are indicative of the high productivity of the Cohocton River. The reach upstream of Savona is a high quality, cold-water fishery. This fishery was impaired during the construction of the Route 17 Expressway due to sedimentation, loss of vegetation near stream banks and reduced depth of water due to siltation, but has since recovered. Due to the productive nature of the stream, some problems associated with failing on-lot sewage system and urban runoff have been observed near Bath and Campbell.

The three major tributaries to the Cohocton River (Five Mile Creek, Mud Creek and Meads Creek) support healthy populations of aquatic life indicating good quality water (McMorran, 1985b). Waneta Lake and Lamoka Lake, the source of Mud Creek, are

slightly degraded (severe in September) from cultural eutrophication (NYDEC, 1981b). This has increased the aquatic damage due to infectious agents, thermal pollution and reduced the quality of the recreational and fishery resources.

The Tioga River (Figure 10) is severely degraded for half of its length by acid mine drainage (McMorran, 1985b; PaDER, 1986). The Tioga River has excellent water quality and supports a native brook trout fishery from its source to its confluence with Fall Brook. However, from Fall Brook downstream to Tioga Lake, a distance of 27 miles, water quality is very poor. Acid mine drainage lowers pH and carries toxic concentrations of metals and dissolved solids. As a result, only the most pollution tolerant aquatic invertebrates are present in the Tioga River.

The source of this acid mine drainage is abandoned underground coal mines east of Blossburg. Overflows from these mines enter Fall Brook, Morris Run, Bear Creek and Coal Creek rendering them devoid of aquatic life (McMorran, 1985b). Two other streams entering the Tioga River near Blossburg, Fellows Creek and Johnson Creek, have little or no alkalinity, but have relatively minor impacts upon the Tioga River.

Downstream of Blossburg, tributaries entering the Tioga River are high in alkalinity and contribute to an improvement in the acidic condition of the Tioga River (McMorran, 1985b). Cory Creek, Mill Creek and Crooked Creek, the largest of these tributaries, have good quality water and healthy fish and macroinvertebrate populations.

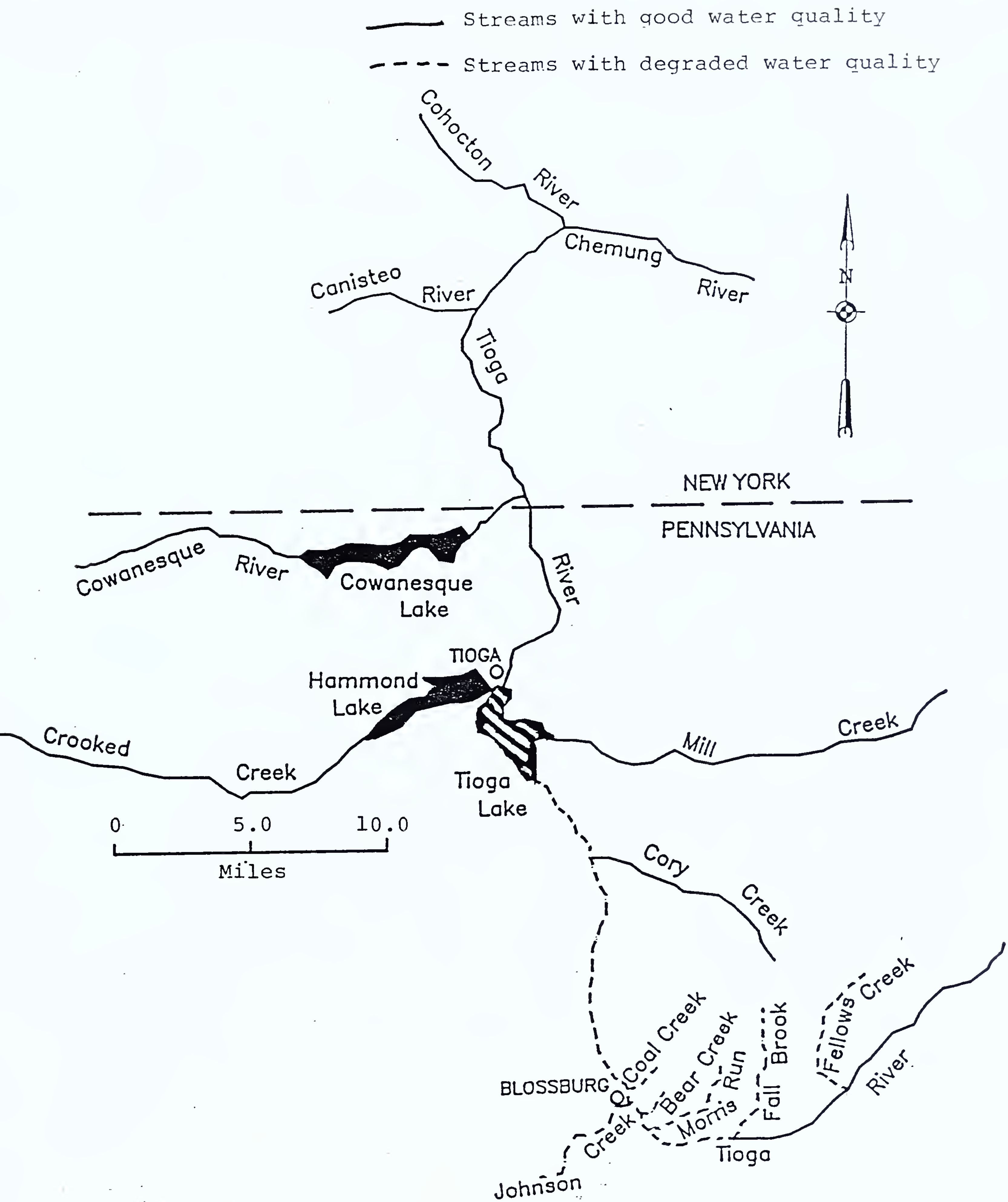


FIGURE 10 - WATER QUALITY OF THE TIOGA RIVER WATERSHED

Historically, Tioga River had recovered from the impact of the acid mine drainage at its confluence with the Cowanesque River at the New York/Pennsylvania state line (NYDEC, 1986). However, under certain flow conditions intermittent degradation occurred as far downstream as Corning. The construction of the Tioga-Hammond project by the Corps of Engineers (COE) has improved the quality of water in the Tioga River upstream as far as Tioga, Pennsylvania. This project involved the construction of two dams, one on Crooked Creek (Hammond Lake) and one on the Tioga River (Tioga Lake). Hammond Lake stores alkaline water from Crooked Creek that is mixed with the Tioga Lake discharge at the spillway to neutralize the acidic waters of Tioga Lake. Thus the quality of the Tioga River downstream of Tioga Lake is good enough to consistently support fish and macroinvertebrate populations (Bieber, 1984).

Several miles downstream of the confluence with the Cowanesque River, the Canisteo River enters the Tioga River. This reach has good water quality (Bieber, 1984), but it is still classed as severely impaired for fish propagation by NYDEC (NYDEC, 1986). This designation should be changed to reflect existing conditions.

The Chemung River is formed by the confluence of the Tioga and Cohocton Rivers (Figure 11). Water quality in the Chemung River is good due to the good conditions in both the Tioga and Cohocton rivers. The Chemung River receives municipal and industrial discharges from the city of Corning, but these discharges cause only minor degradation (NYDEC, 1981b).

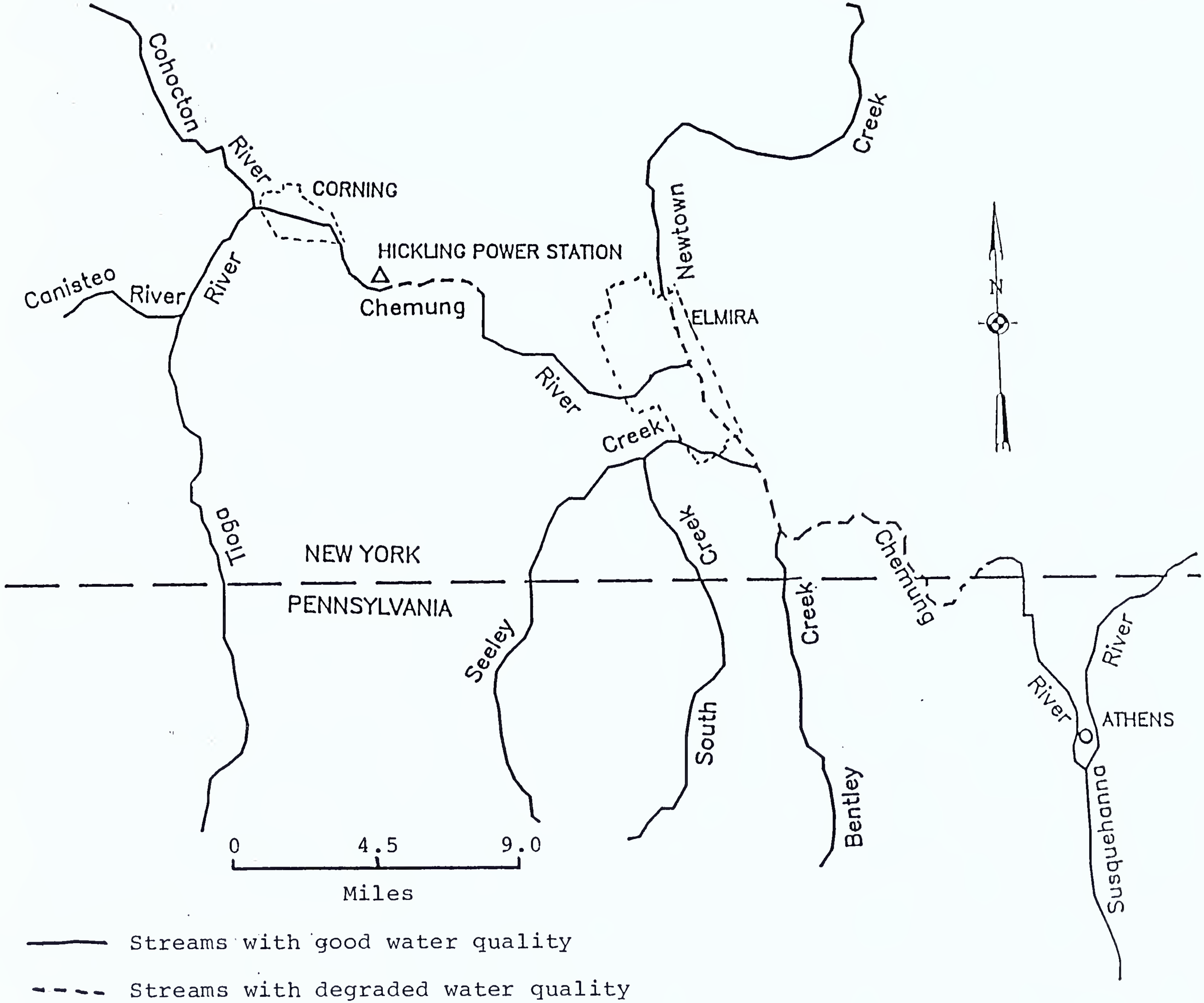


FIGURE 11 - WATER QUALITY OF THE CHEMUNG RIVER WATERSHED

Downstream of Corning, New York State Electric and Gas's Hickling power station withdraws a significant portion of the Chemung River's flow for cooling. Depending upon the ratio of stream flow to withdrawal, stream temperatures may be increased as much as 20^{O}F above ambient (NYDEC, 1981b). This exceeds water quality standards and can potentially have effects on aquatic life. However, this is the only major discharge to the reach between Corning and Elmira and most of this reach has good quality. Healthy macroinvertebrate populations indicate little degradation (McMorran, 1985b).

The Chemung River is degraded by municipal and industrial discharges from Elmira and from poor quality water from Newtown Creek (McMorran, 1985b; NYDEC, 1986). The upper reach of Newtown Creek have good water quality but between Horseheads and the Chemung River it is severely impaired for secondary contact recreation due to excessive chemical and physical conditions and toxic substances. Fish and macroinvertebrate communities are severely stressed.

Degradation in the Chemung River extends downstream over 10 miles. Fecal coliform samples collected at Chemung show that Pennsylvania standards are being violated (McMorran, 1987). The Elmira-Chemung County Sewer District is upgrading its STP and compliance with water quality standards is expected by July 1988.

The Chemung River recovers from this degradation as it flows downstream. Near its confluence with the Susquehanna River at Athens, Pennsylvania it has good quality water and healthy fish and macroinvertebrate communities (Malione, et.al., 1984).

UPPER SUSQUEHANNA SUBBASIN

This subbasin includes the area drained by the Susquehanna River between its confluences with the Chemung River and the West Branch Susquehanna River (Figure 12). The Chemung and Susquehanna Rivers upstream of this subbasin both have good water quality although high bacteria concentrations have been observed indicating poor treatment of domestic wastes and agricultural runoff problems. This does not seem to impact the quality of the Susquehanna River because fish and macroinvertebrate communities are healthy.

The reach of the Susquehanna River between the Chemung River and the Lackawanna River (Figure 13) has excellent water quality (Malione, et.al., 1984). Major point sources are few: one industrial discharge and one municipal discharge from Towanda, and one industrial discharge from a paper mill at Mehoopany. These discharges have only localized effects on the quality of the Susquehanna River. Water quality is also affected by non point sources such as agricultural runoff and siltation. These impacts are minor; fish and macroinvertebrate communities are healthy and abundant throughout this reach indicating excellent water quality.

Sugar Creek (Figure 13) has good water quality (Malione, et. al, 1984). The stream drains a rural agricultural watershed. There are few point sources of degradation but bank erosion, sedimentation and lack of cover may limit the fishery in some areas (PaDER, 1986). Thirty-four miles of stream are affected to some degree by agricultural runoff and siltation, but fish and

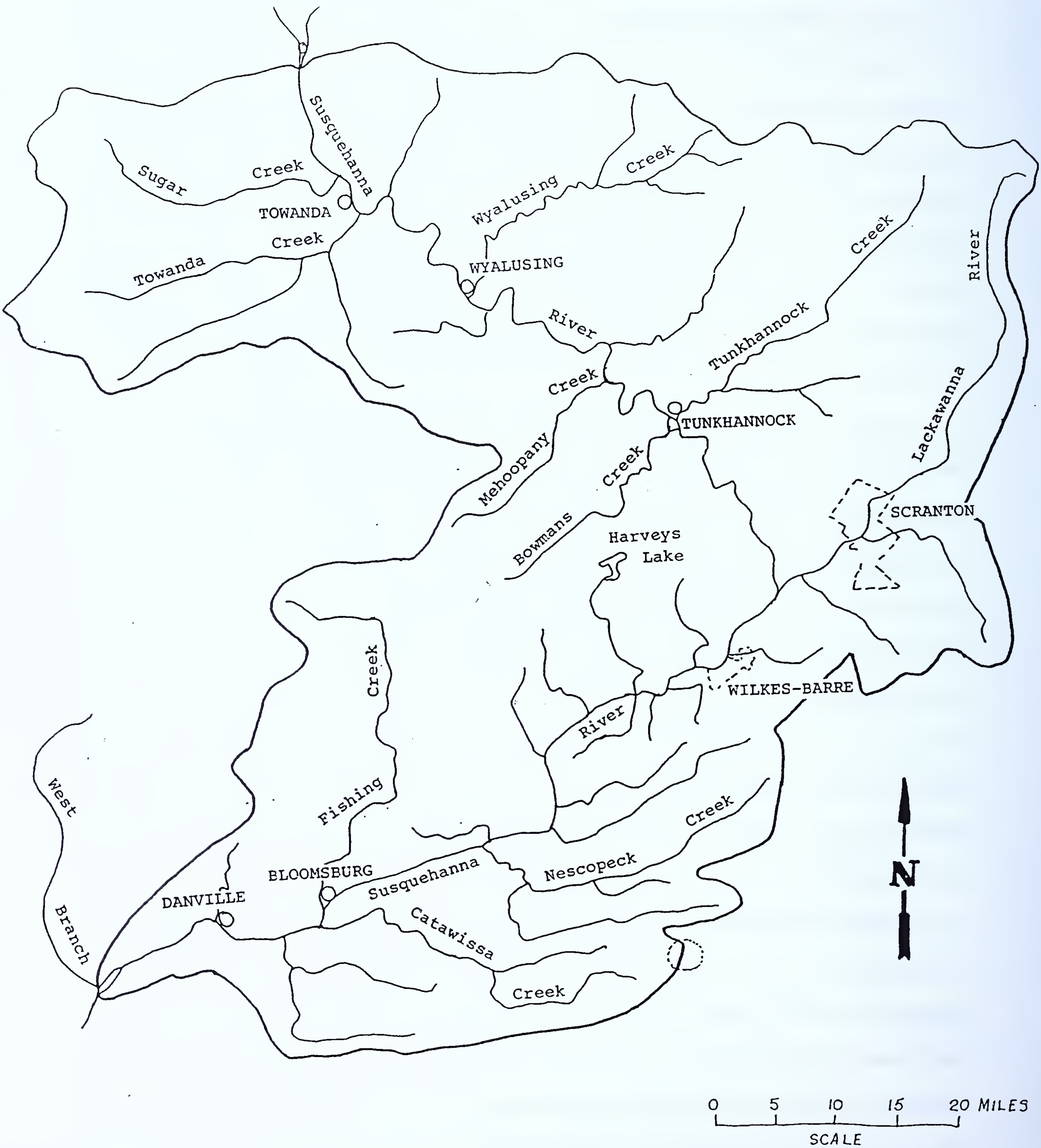


FIGURE 12 - UPPER SUSQUEHANNA SUBBASIN

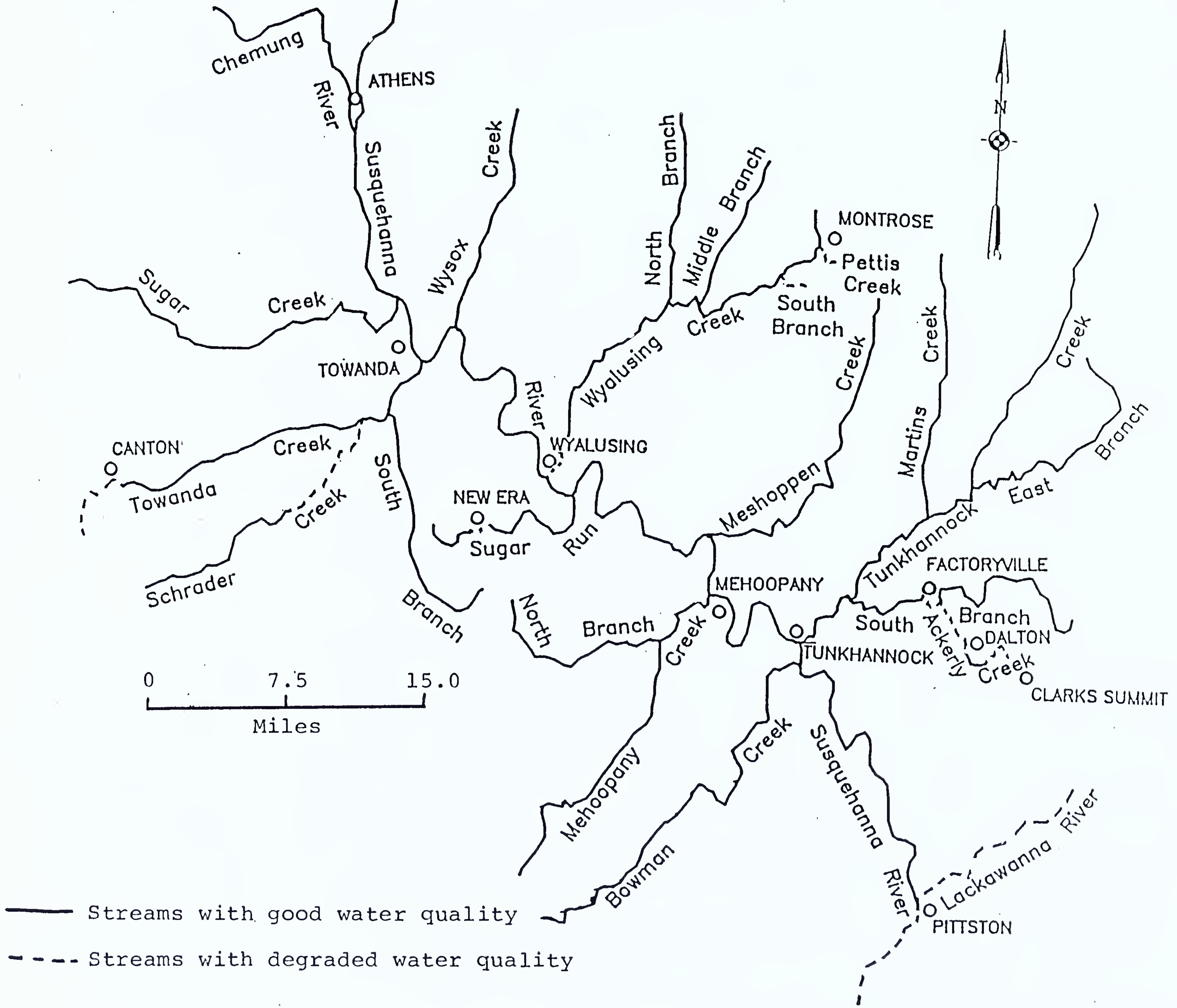


FIGURE 13 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED BETWEEN THE CHEMUNG RIVER AND THE LACKAWANNA RIVER

macroinvertebrate communities are healthy indicating little pollution stress.

Towanda Creek (Figure 13) experiences water quality degradation from several sources. Although most of the stream is of excellent quality, discharges from the Canton area and acid mine drainage from the Schrader Creek watershed cause localized degradation (PaDER, 1986). The problems in Canton originate from two sources: municipal wastes from Canton and industrial wastes from a dairy products plant. Both of these problems are being corrected. The lower half of Schrader Creek is severely stressed by overflows from abandoned coal mines but its impact on Towanda Creek is not severe. Eight miles of Towanda Creek are degraded to minor degrees by agricultural runoff. Towanda Creek, the upstream half of Schrader Creek and South Branch Towanda Creek have excellent water quality.

Wyalusing Creek (Figure 13) drains a large agricultural area. As a result, 22 stream miles are impacted to some degree by agricultural runoff (PaDER, 1986). However, these impacts are minor as good water quality and healthy fish and macroinvertebrate populations are present throughout most of the stream. The Borough of Montrose STP discharges into Pettis Creek, a headwater tributary to Wyalusing Creek. One half mile of Pettis Creek is degraded due to this discharge (PaDER, 1984e).

South Branch Wyalusing Creek is degraded for its whole length. Degradation in the upper two miles are due to low base flow conditions and on-lot sewage discharges. The lower seven miles are impacted by sediment loading, high agricultural runoff and nutrient enrichment.

The Borough of Wyalusing discharges untreated sewage wastes directly to Wyalusing Creek, degrading three miles (Malione, et.al., 1984).

Sugar Run (Figure 13) has good water quality (Malione, et.al., 1984). Healthy fish and macroinvertebrate populations are present throughout the stream indicating an absence of pollution stress. However, near New Era one half mile of stream is degraded by leachate from a landfill.

Tunkhannock Creek (Figure 13) drains a large watershed and water quality is degraded by a number of point and nonpoint sources. Eight miles of Tunkhannock Creek are degraded by agricultural runoff (PaDER, 1986) but effects are minor as indicated by the presence of healthy communities of fish and macroinvertebrates throughout the stream. Point source pollution, primarily raw sewage, degrades water quality in several reaches of Ackerly Creek, a tributary to South Branch Tunkhannock Creek (PaDER, 1984b). The upper reach of the stream receives an STP discharge from Clarks Summit. The middle reach of Ackerly Creek recovers good water quality, but the lower reach is degraded by the STP discharge from Dalton. The effects of these discharges are compounded by significant warming and low dissolved oxygen conditions due to a low gradient, low flow and presence of several ponds.

Several tributaries to the Susquehanna River in this area (Figure 13) have good or excellent water quality. Wysox Creek, Meshoppen Creek, Mehoopany Creek and Bowman Creek all support healthy biological communities and several are high quality trout

streams (Malione, et.al., 1984). These streams drain rural watersheds where few sources of water pollution exist.

The Susquehanna River begins to receive pollutants from other streams, mine drainage and urban discharges as it enters the Wyoming Valley at Pittston (Figure 14) (Malione, et.al., 1984). Poor quality water is received from the Lackawanna River, Toby Creek, Solomon Creek and several other smaller tributaries. Several of these streams carry acid mine drainage as well as urban wastes and runoff. This pollution impairs water quality in the Susquehanna River. Fortunately, degradation is not too severe and fish and macroinvertebrate communities remain reasonably healthy throughout this reach. Overall water quality of the Susquehanna River declines compared to the upstream reach, but maintains fair to good quality depending upon local circumstances. This marks an improvement over very poor water quality documented by LaBuy (1967). Much improvement has been made but cleanup efforts need to continue.

The Lackawanna River (Figure 14) is one of the larger tributaries to the Susquehanna River in this subbasin. Water quality in the watershed is adversely affected by urban development and coal mining (Malione, et.al., 1984). Water quality in the Lackawanna River is good from its headwaters downstream to Carbondale. This reach is relatively undeveloped and supports a healthy cold water fishery. Between Carbondale and the confluence with the Susquehanna River, the Lackawanna River valley is the site of the city of Scranton and surrounding towns. This urban complex generates a large pollution load in

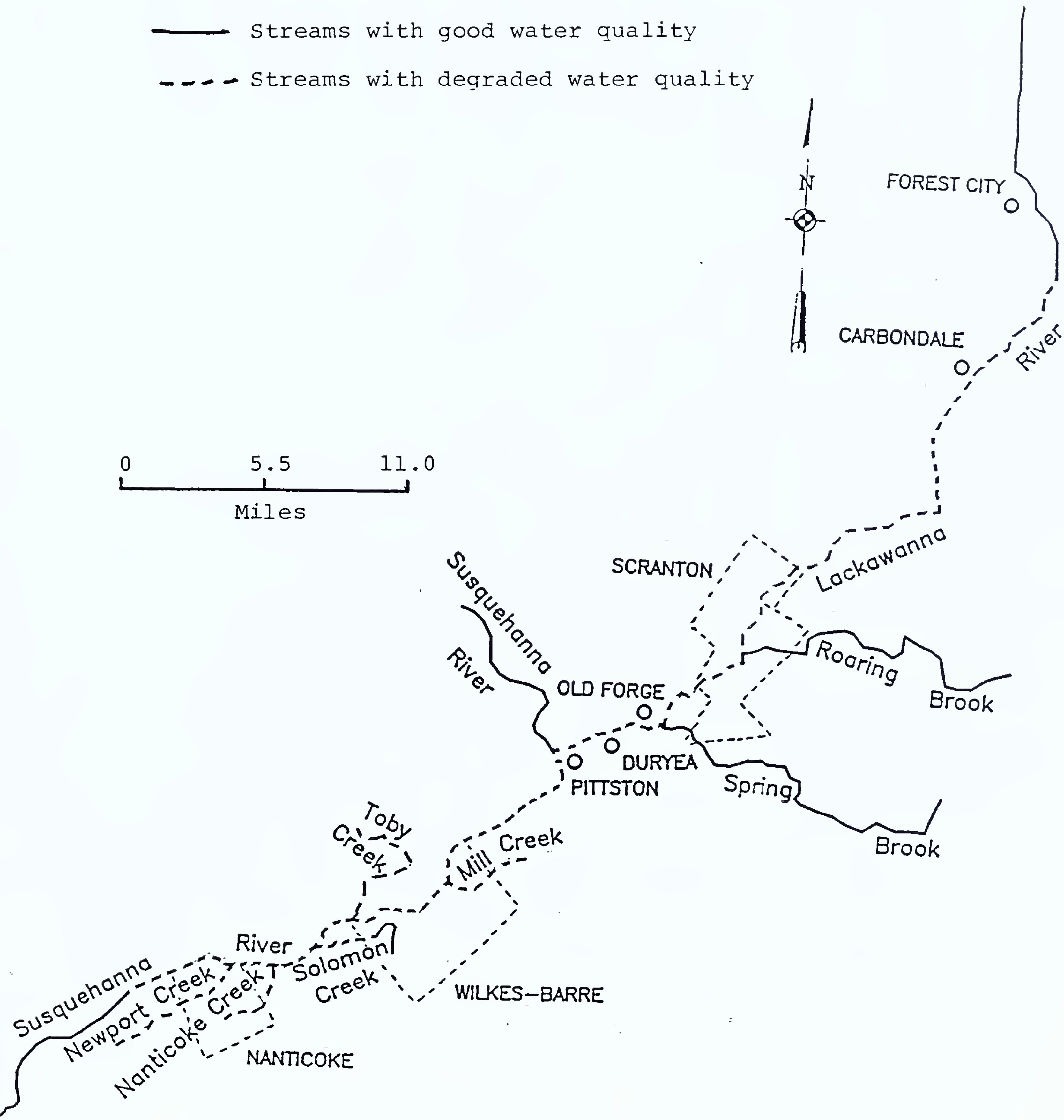


FIGURE 14 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED BETWEEN LACKAWANNA RIVER (INCLUSIVE) AND NANTICOKE

the form of municipal wastes and urban runoff. The improvement of sewage treatment facilities is under way but improvement of water quality is complicated by acid mine drainage abandoned coal mines. These mines are filled with water and overflow at the surface at a number of points between Forest City and the mouth of the Lackawanna River. The two largest discharges are from outfalls at Old Forge and Duryea. An average annual discharge of 110 cfs (Hollowell and Koester, 1975) eliminates most of the aquatic life in the lower three miles of the Lackawanna River (Malione, et.al., 1984). The middle reach of the river between Carbondale and Duryea supports varying levels of aquatic life depending upon the frequency and severity of pollution loads. A total of 33 miles of stream are degraded and corrective programs are deficient due to lack of funding.

Spring Brook (Figure 14) is an excellent quality tributary to the Lackawanna River and supports wild trout populations (Rider and Blacksmith, 1985b). However, its water quality has been degraded by Giardiasis organisms in recent years. Another tributary to the Lackawanna River, Roaring Brook, has excellent quality (Rider and Blacksmith, 1985a). It supports excellent numbers of wild trout where good habitat is available.

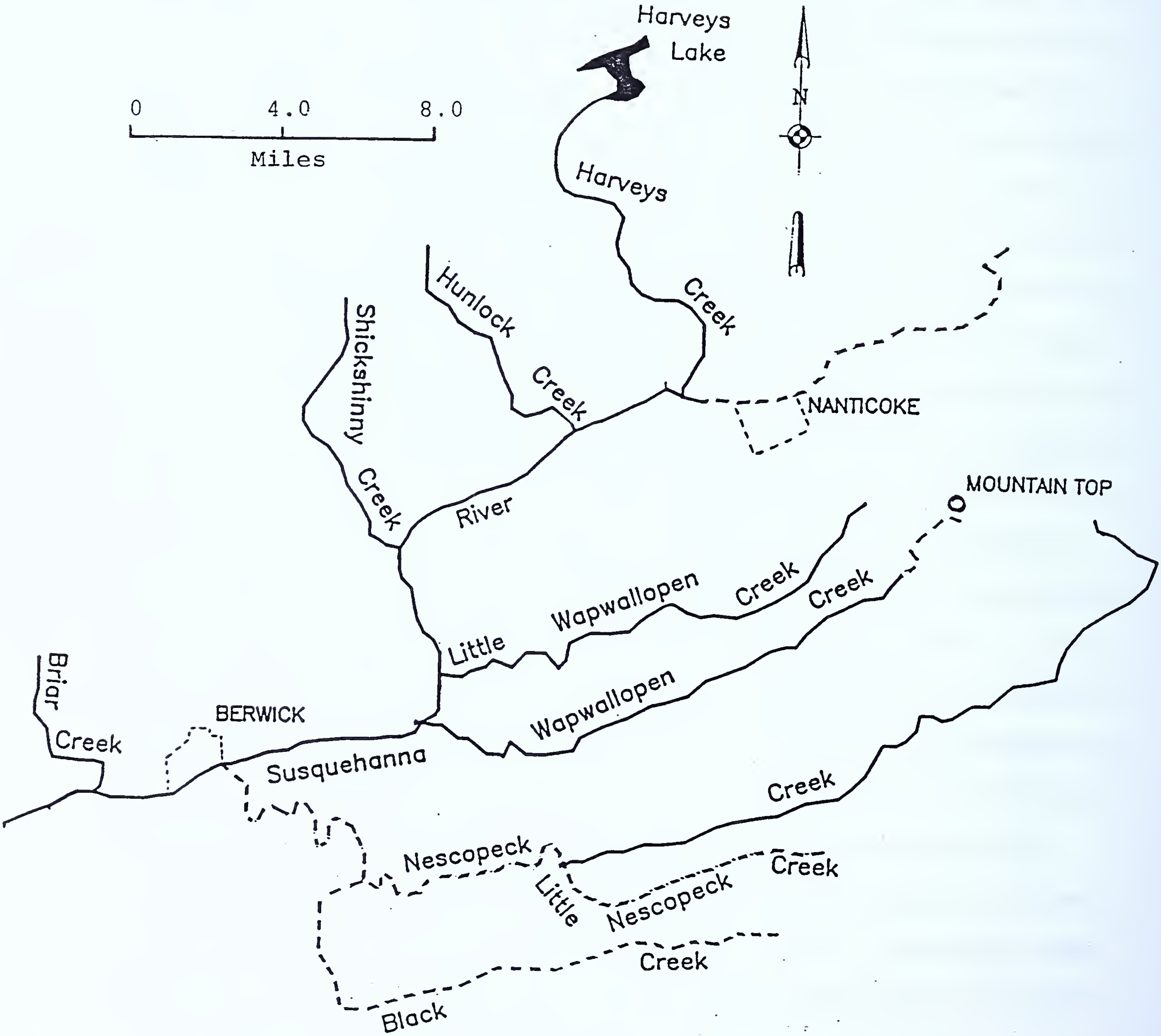
Several smaller tributaries enter the Susquehanna River between Pittston and Nanticoke (Figure 14). These are all adversely impacted by urban runoff or acid mine drainage. Mill Creek and Toby Creek enter the Susquehanna River near Wilkes-Barre. Both streams are cluttered with trash and garbage and fail to support healthy fish and macroinvertebrate communities

due to urban runoff. Toby Creek has been diverted underground for several miles and receives raw sewage from unknown sources. Solomon Creek, Nanticoke Creek and Newport Creek have some of the poorest quality water in the Basin. All three carry large loads of acid mine drainage that eliminate most aquatic life.

Downstream of the Wyoming Valley, from Harveys Creek to the confluence with the West Branch Susquehanna River (Figures 15 and 16), the Susquehanna River recovers from the pollution loads it received upstream (Malione, et.al., 1984). Water quality in this reach does not return to the high levels upstream of the Wyoming Valley due, in part, to more pollution loads from Nescopeck Creek and Catawissa Creek. However, fish and macroinvertebrates are abundant and the good quality of the Susquehanna River allows the pursuit of most water related uses.

Wapwallopen Creek (Figure 15) has a past history of pollution problems in its headwaters near Mountain Top (PaDER, 1986). These problems were traced to industrial wastes, untreated sewage and agricultural runoff. Impacts are limited to the headwater region and most of Wapwallopen Creek is a high quality cold water stream with excellent water quality.

Nescopeck Creek (Figure 15) has good quality water from its headwaters downstream to its confluence with Little Nescopeck Creek (Malione, et.al., 1984). However, Little Nescopeck Creek is severely degraded by acid mine drainage and has a negative impact on Nescopeck Creek. Black Creek is another tributary with very poor quality water. It is polluted by municipal and industrial wastes from the Hazleton area as well as by acid mine



Streams with good water quality

Streams with degraded water quality

FIGURE 15 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED BETWEEN NANTICOKE AND BRIAR CREEK

drainage from a number of sources. The poor quality water from these two tributaries degrade Nescopeck Creek from its confluence with Little Nescopeck Creek downstream to its confluence with the Susquehanna River. Nescopeck Creek has poor quality water throughout this reach and has an adverse impact on the quality of the Susquehanna River.

Harveys Creek, Hunlock Creek and Shickshinny Creek (Figure 15) have good water quality. Few areas of degradation have been documented in these streams. Localized areas of degradation may exist, but for the most part these streams support abundant and diverse fish and macroinvertebrate communities indicative of a lack of pollution stress.

Catawissa Creek (Figure 16) is badly degraded for all of its length (18 miles) by acid mine drainage (Malione, et.al., 1984). A major tributary, Tomhickon Creek, is also degraded for all of its length by acid mine drainage (PaDER, 1986). Catawissa Creek has an adverse impact on the quality of the Susquehanna River.

The other streams entering the Susquehanna River between Briar Creek and Northumberland (Figure 16) have good water quality. Briar Creek, Fishing Creek, Roaring Creek and Mahoning Creek drain agricultural and forested watersheds. The general lack of pollution in these streams is indicative of the low impact rural land uses have on streams. Localized areas of degradation may exist due to non point source pollution or sewage discharges, but no areas of serious degradation have been documented. These streams support abundant and diverse fish and macroinvertebrate communities, another indicator of excellent water quality.

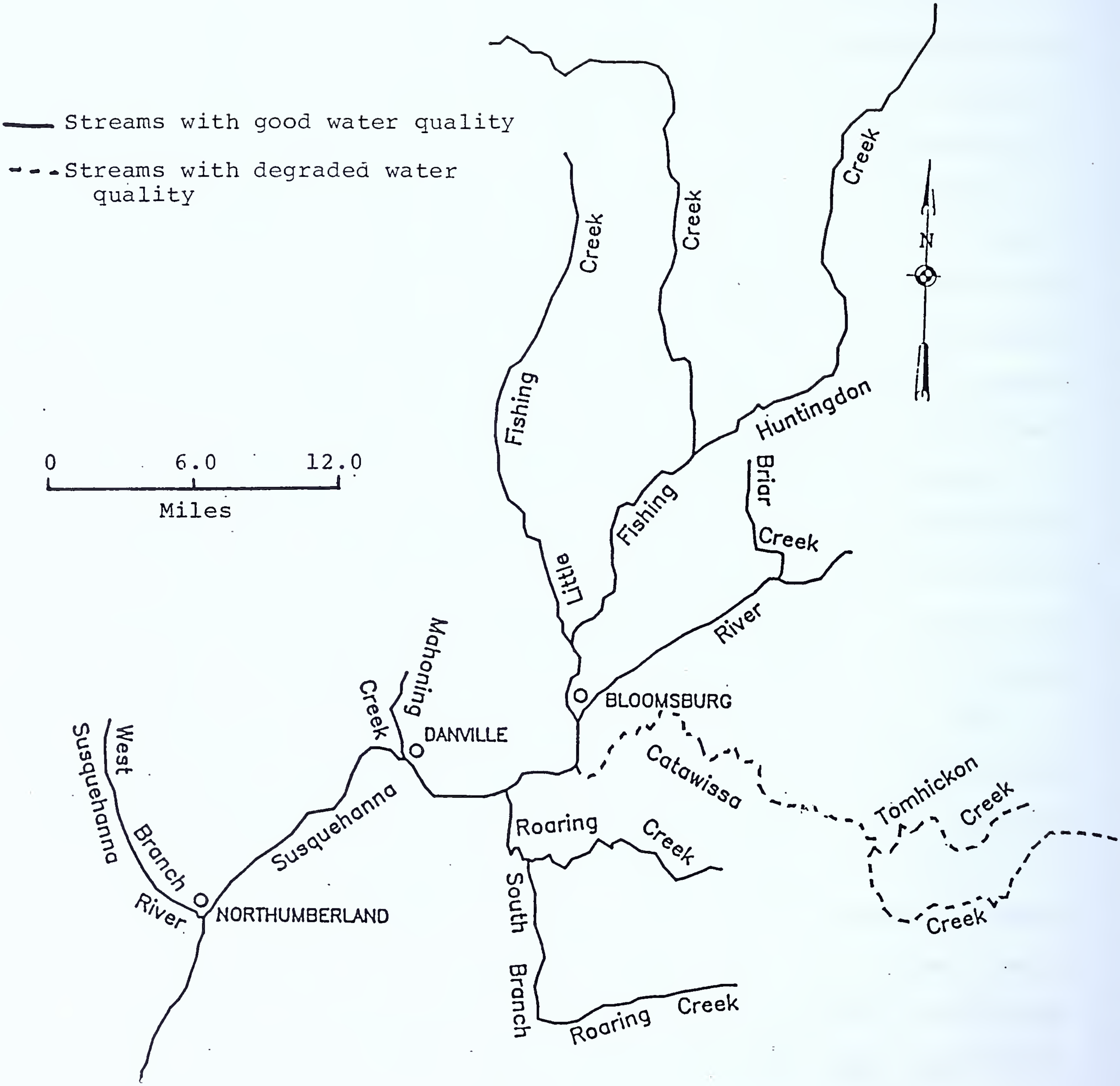


FIGURE 16 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED BETWEEN BRIAR CREEK (INCLUSIVE) AND THE WEST BRANCH SUSQUEHANNA RIVER

WEST BRANCH SUBBASIN

The West Branch Susquehanna River (Figure 17) has more miles of degraded water than any other stream in the Basin (McMorran, 1985a). The western end of the West Branch Subbasin is underlain by bituminous coal. As a result, 121 miles of river are degraded by acid mine drainage. This degradation is present at the source of the West Branch Susquehanna River (Figure 18). At Cherry Tree, 14 miles downstream, the river begins to show some improvement, however degradation persists and is exacerbated by domestic pollution. Water quality in this initial reach from the source to McGees Mills ranges from fair to poor.

From McGees Mills downstream to Curwensville (Figure 18), the West Branch returns to good water quality. Several streams, the largest being Chest Creek, contribute good quality water to the West Branch. Compared to twenty years ago, great improvements in water quality have taken place in this reach. Between Curwensville and Clearfield water quality declilnes due to acid mine drainage from Anderson Creek and Montgomery Creek, and industrial and domestic wastes and urban runoff from Curwensville.

Cush Creek (Figure 18) is degraded by acid mine drainage (McMorran, 1985a). Reduced macroinvertebrate populations and elevated levels of chemical parameters suggest intermittent pollution. However, Cush Creek appears to maintain a net positive alkalinity and thus has a beneficial impact on the acidic conditions of the West Branch Susquehanna River.

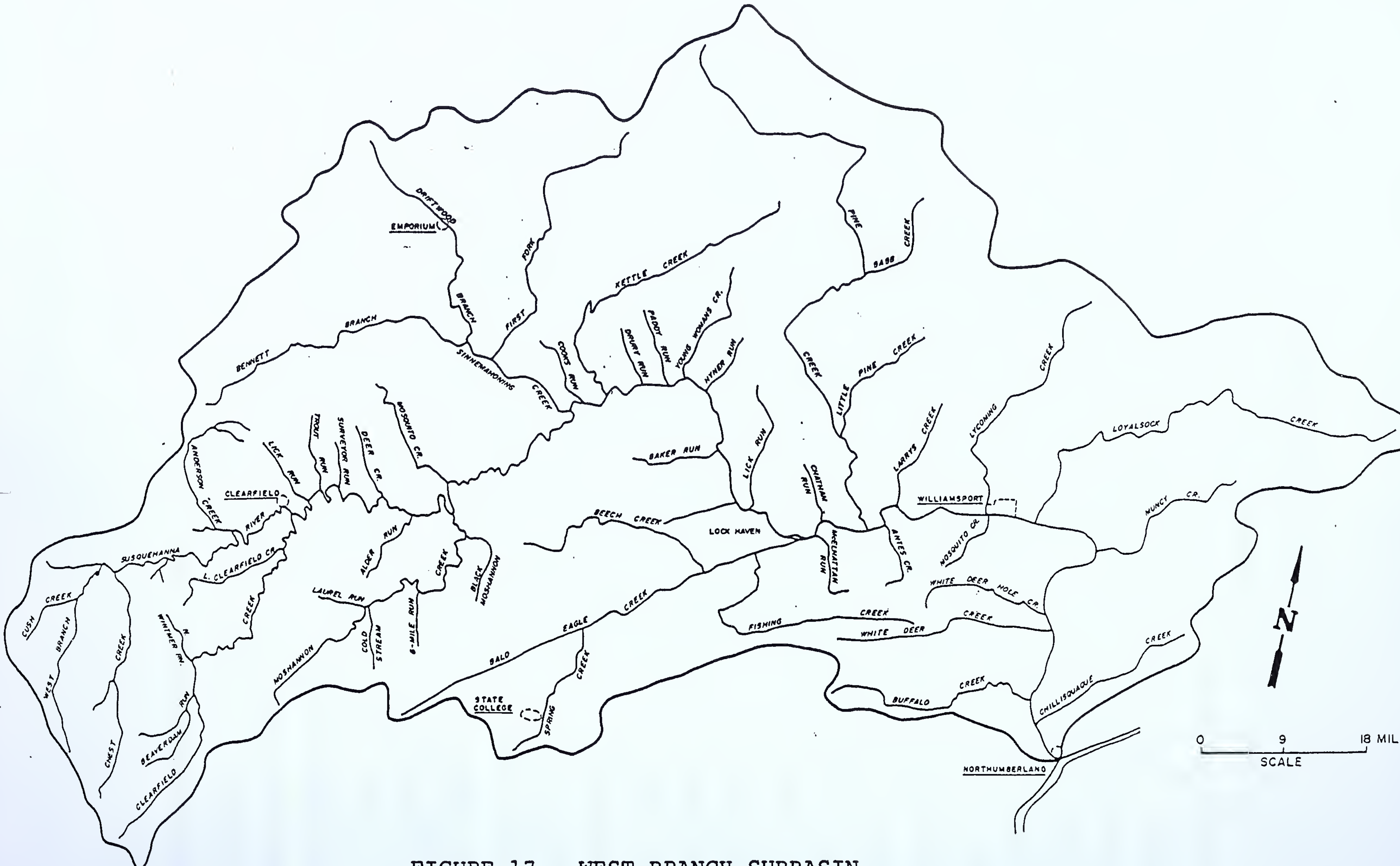
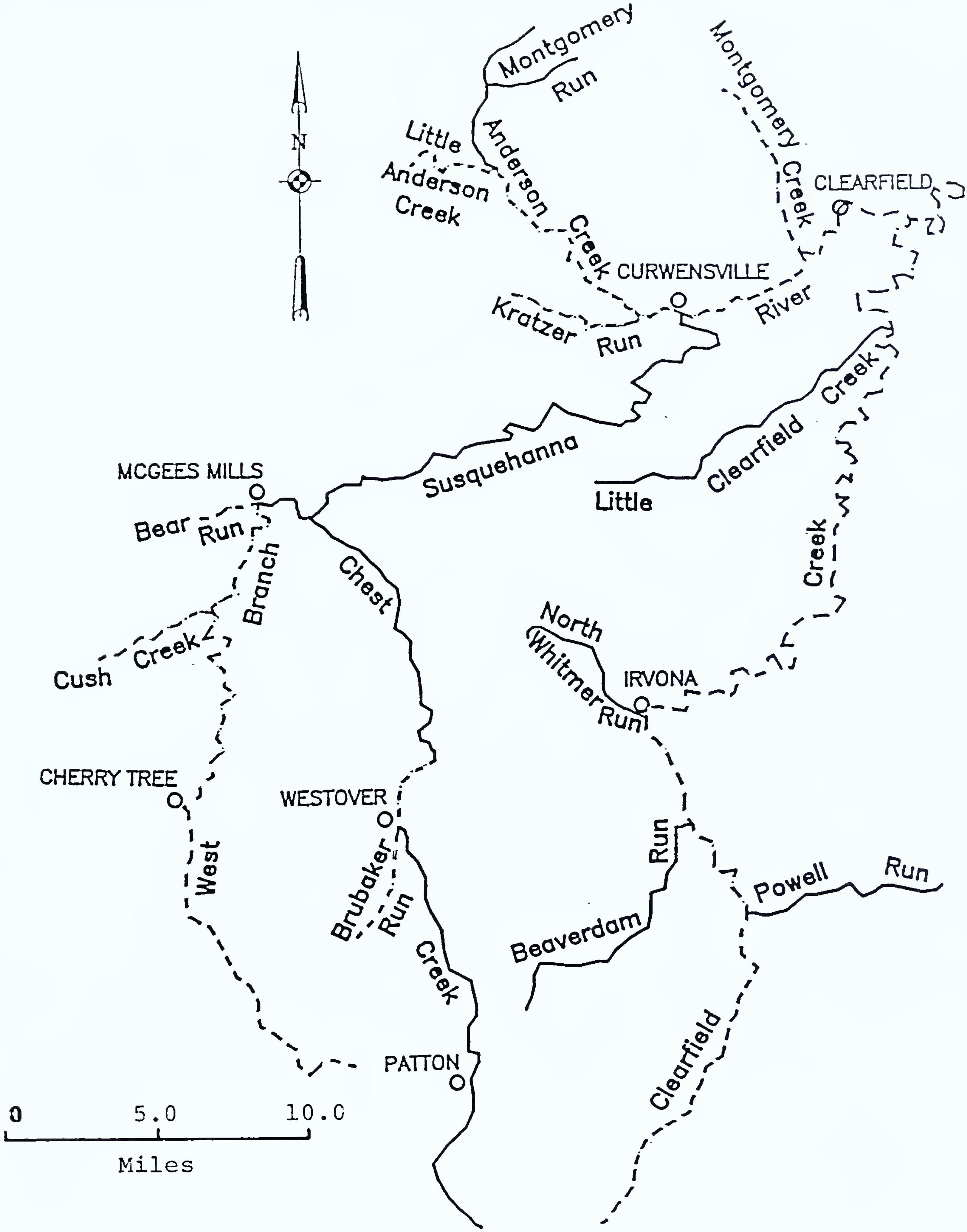


FIGURE 17 - WEST BRANCH SUBBASIN



Streams with good water quality

Streams with degraded water quality

FIGURE 18 - WATER QUALITY OF THE WEST BRANCH SUSQUEHANNA RIVER WATERSHED UPSTREAM OF CLEARFIELD CREEK (INCLUSIVE)

Bear Run (Figure 18) is severely degraded by acid mine drainage (McMorran, 1985a). No aquatic life is present due to excessive levels of metals and dissolved solids.

Water quality in Chest Creek (Figure 18) is good throughout most of the stream (McMorran, 1985a). Acid mine drainage from Brubaker Run adversely affects five miles of Chest Creek near Westover (PaDER, 1986). Minor degradation is also present near Patton due to organic pollution and siltation. However, water quality conditions are such that healthy communities of fish and macroinvertebrates are present throughout the stream. This marks a significant improvement in water quality over conditions observed during the mid 1960's when degradation due to acid mine drainage and organic pollution was widespread.

Ten miles of Anderson Creek (Figure 18) are degraded due to the effects of acid mine drainage (PaDER, 1986). This pollution originates mainly from abandoned clay mines in the Kratzer Run and Little Anderson Creek watersheds (Gwin Engineers, 1974). Water quality is very poor and fish and macroinvertebrates are absent in Anderson Creek from the confluence with Little Anderson Creek to the confluence with the West Branch Susquehanna River. Upstream of the confluence with Little Anderson Creek, Anderson Creek is an excellent quality stream. An impoundment near the confluence with Montgomery Run provides water supply for the borough of DuBois.

Clearfield Creek (Figure 18) is degraded most of its 61 miles in length by acid mine drainage (McMorran, 1985a). Water quality is fair in its upper reaches with reduced numbers of fish

and macroinvertebrates. Water quality declines downstream and fish and macroinvertebrates are absent from Irvona to the confluence with the West Branch. Good to excellent water quality is present in the major tributaries to Clearfield Creek: Beaverdam Run, North Whitmer Run and Little Clearfield Creek. Another tributary, Powell Run, has excellent water quality and the watershed has been designated as an area that is unsuitable for mining in order to protect a water supply, its recreational use and wildlife properties of the watershed. Unfortunately, these tributaries do not provide enough flow to have any significant effect on the severe degradation of Clearfield Creek.

Downstream of Clearfield, Clearfield Creek enters the West Branch and severely degrades its water quality. This marks the beginning of a 104 mile reach of river where water quality is poor and fish and macroinvertebrates are absent. Many sources of acid mine drainage enter the river between Clearfield Creek and Sinnemahoning Creek (Figure 19). Water quality is progressively poorer downstream as more streams degraded by acid mine drainage enter the river.

Lick Run (Figure 19) suffers degradation throughout its lower reaches due to acid mine drainage (McMorran, 1985a; PaDER, 1986). Six miles of stream have elevated concentrations of chemical parameters and reduced aquatic life. The upper reaches of Lick Run and several tributaries are of better quality and several have been nominated for the scenic rivers program.

Trout Run (Figure 19) has good water quality (McMorran, 1985a). Low concentrations of chemical parameters indicate that

the stream is infertile. This is also indicated by reduced fish and macroinvertebrate populations. Trout Run has low alkalinity and thus is susceptible to degradation by acid precipitation.

Surveyor Run (Figure 19) is a small stream that receives a large volume of acid mine drainage (McMorran, 1985a). As a result, concentrations of chemical parameters are excessive and no fish or macroinvertebrates are present.

Deer Creek (Figure 19) is degraded by acid mine drainage (McMorran, 1985a). Water quality is poor and only a few individuals of the most acid tolerant macroinvertebrates are present.

Alder Run (Figure 19) is degraded by acid mine drainage (McMorran, 1985a). The stream carries large quantities of dissolved materials that have an adverse impact on the quality of the West Branch Susquehanna River. Only the most pollution tolerant macroinvertebrates are present in Alder Run. Attempts to improve water quality in Alder Run are hindered by the lack of natural alkalinity in the watershed soil and bedrock (Skelly and Loy, 1970).

Moshannon Creek (Figure 19) is degraded by acid mine drainage for 52 miles of its 60 mile length (McMorran, 1985a). Numerous operating and abandoned coal mining operations contribute large loads of acid to the stream. Several tributaries are also degraded by acid mine drainage, including Laurel Run, Black Moshannon Creek and the lower mile of Cold Stream. Six Mile Run, Black Bear Run and the upper reaches of Cold Stream have good or excellent water quality. The value of

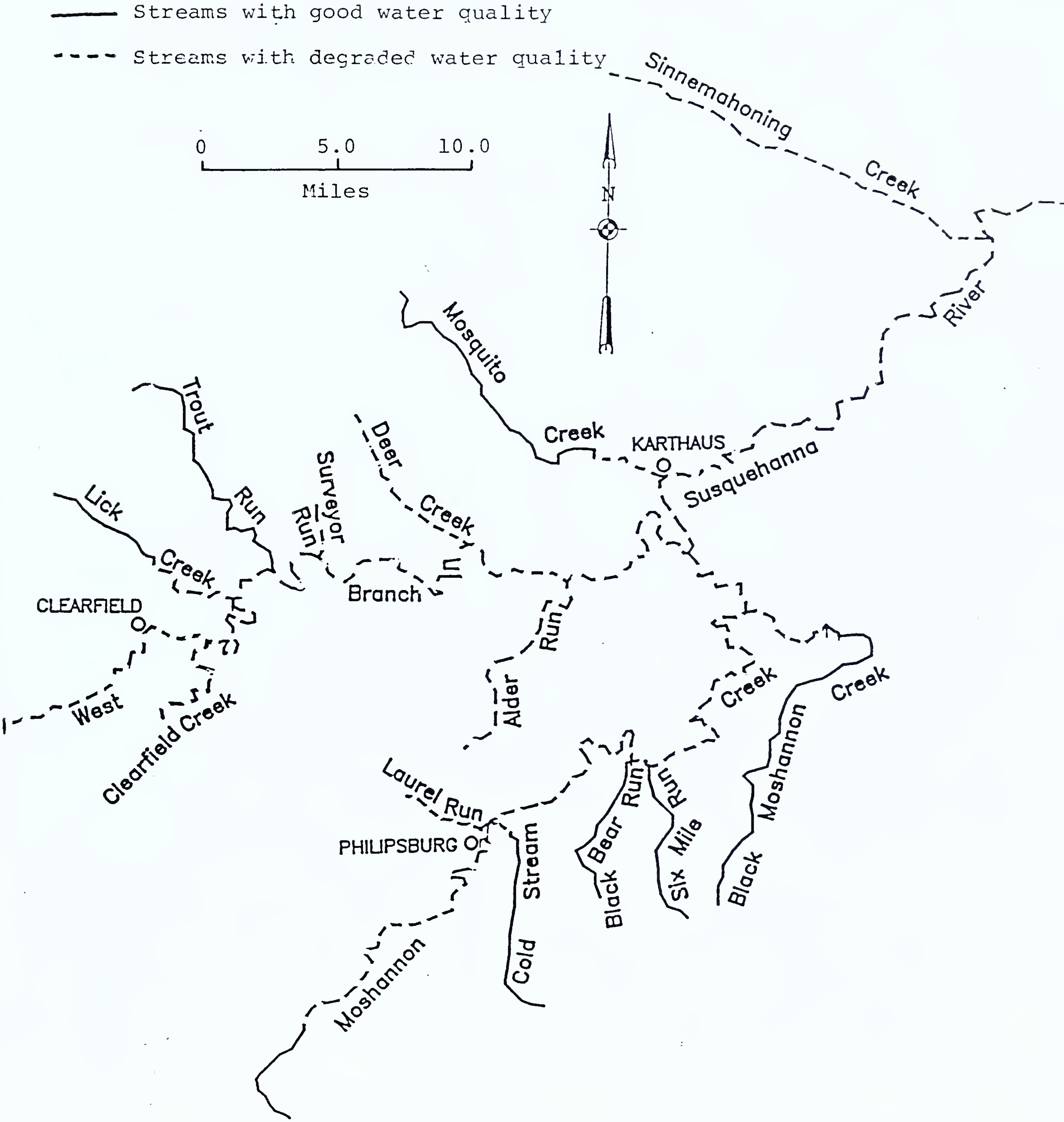


FIGURE 19 - WATER QUALITY OF THE WEST BRANCH SUSQUEHANNA RIVER WATERSHED BETWEEN CLEARFIELD CREEK AND SINNEMAHONING CREEK

these streams in an area of such widespread degradation has been recognized by designating the Black Bear Run and upper Cold Stream watersheds as areas that are unsuitable for surface mining. Moshannon Creek has an adverse impact on the West Branch Susquehanna River by contributing highly acidic waters where pH is consistently less than 3.5. Moshannon Creek contributes over 70,000 pounds of acidity per day to the West Branch, more than all the other tributaries to the West Branch combined.

Mosquito Creek (Figure 19) is degraded in its lower reaches by acid mine drainage (McMorran, 1985a). The aquatic life is stressed and the concentrations of chemical parameters are high. The upper reaches of Mosquito Creek have good water quality and support a cold water fishery.

Sinnemahoning Creek (Figure 20) drains a large watershed with several major tributaries. Driftwood Branch Sinnemahoning Creek and First Fork Sinnemahoning Creek both have healthy fish and macroinvertebrate communities indicative of excellent water quality (McMorran, 1985a). Bennett Branch Sinnemahoning Creek is degraded for a length of 35 miles by acid mine drainage (Berger Associates, 1976). This extends from the village of Penfield to its confluence with Driftwood Branch Sinnemahoning Creek. The Byrnes Run-Kersey Run watershed has high water quality and has been designated as an area that is unsuitable for surface mining. Degradation from Bennett Branch Sinnemahoning Creek extends down the length of Sinnemahoning Creek, a distance of 16 miles (McMorran, 1985a). Macroinvertebrate populations are stressed and fish are absent in the degraded reaches of Bennett Branch

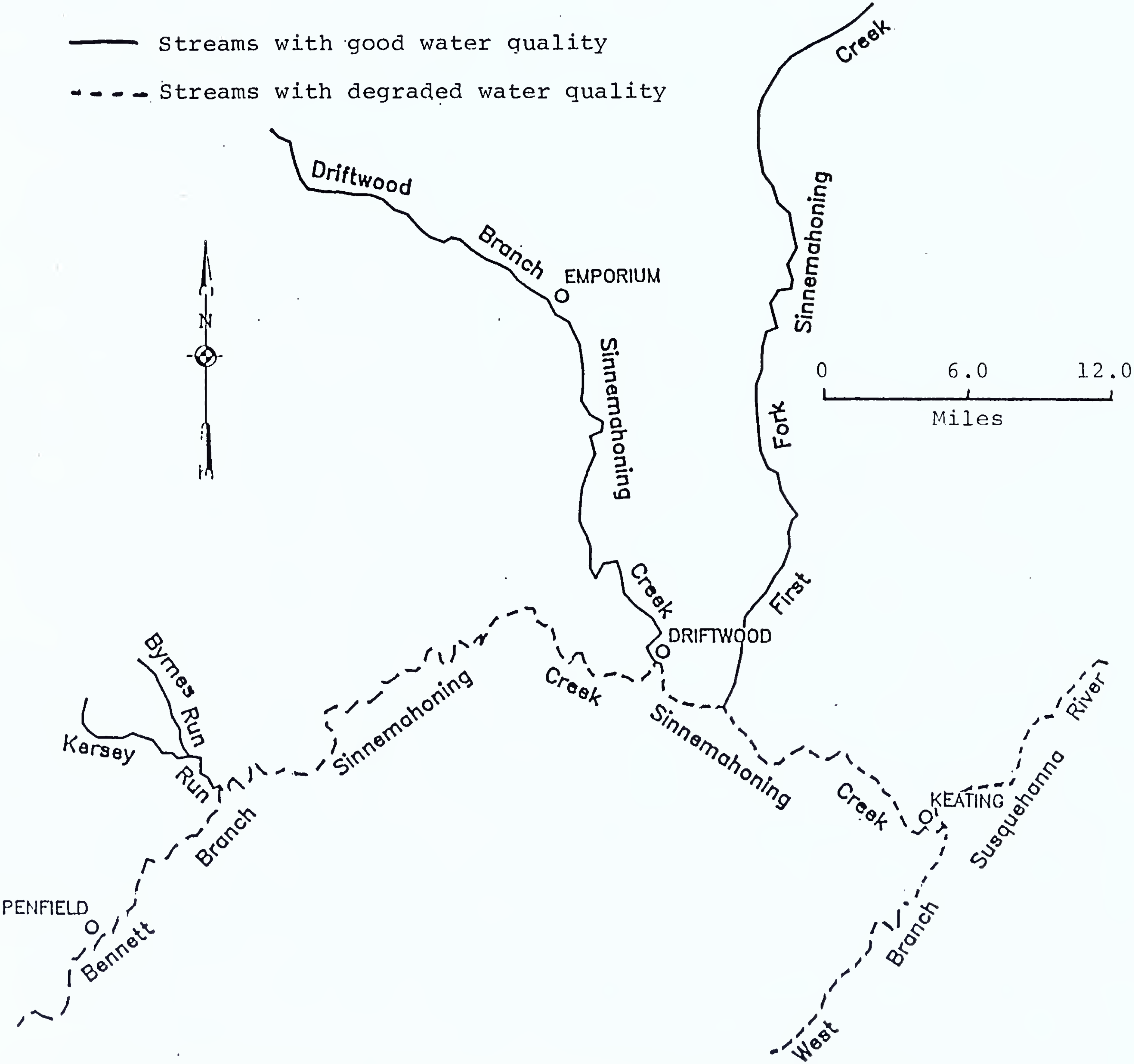


FIGURE 20 - WATER QUALITY OF THE SINNEMAHONING CREEK WATERSHED

Sinnemahoning Creek and Sinnemahoning Creek. Due to its large flow, efforts to improve the water quality of Sinnemahoning Creek could have beneficial impacts on the water quality of the West Branch Susquehanna River.

Between Sinnemahoning Creek and Renovo (Figure 21), the West Branch Susquehanna River continues to receive polluted waters from streams degraded by acid mine drainage (McMorran, 1985a). The major sources are Cooks Run, Kettle Creek and Drury Run. Downstream of Renovo, the West Branch Susquehanna River flows out of the coal mining region. Tributaries here have excellent water quality and have beneficial impacts upon the quality of the West Branch. Unfortunately, these tributaries are too small to have a significant impact on the river. Improvements in water quality are observable but fish are absent and only the most tolerant macroinvertebrates can be found. This condition of poor water quality persists downstream as far as Lock Haven.

Cooks Run (Figure 21) has very poor water quality due to acid mine drainage (McMorran, 1985a). Fish and macroinvertebrates are absent and concentrations of chemical parameters are excessive. Even though Cooks Run drains a small watershed and has a low flow, it worsens the degraded quality of the West Branch Susquehanna River.

Kettle Creek (Figure 21) has excellent quality water and healthy fish and macroinvertebrate populations in reaches throughout most of its watershed (McMorran, 1985a). The headwater areas are especially well known as a high quality fishery. However, the lower reach of Kettle Creek receives large

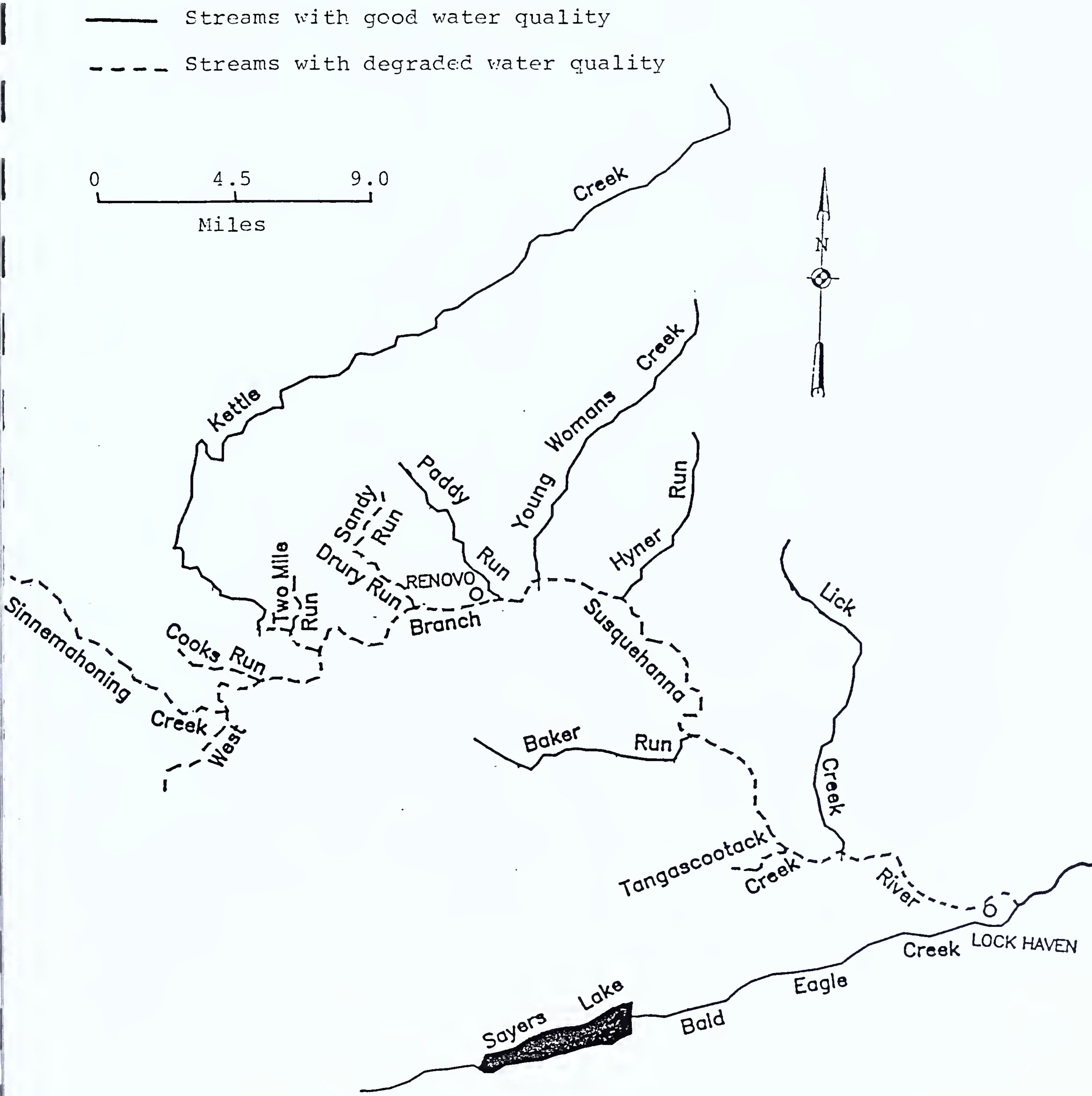


FIGURE 21 - WATER QUALITY OF THE WEST BRANCH SUSQUEHANNA RIVER WATERSHED BETWEEN SINNEMAHONING CREEK AND BALD EAGLE CREEK

amounts of acid mine drainage that destroy the character of the stream. Acid mine drainage enters Kettle Creek from a series of seeps found five miles upstream from the mouth. Another source of acid mine drainage is Two Mile Run. These sources contribute excessive amounts of metals and acidity and are deadly to fish and macroinvertebrates as indicated by their absence from the lower reach of Kettle Creek. Kettle Creek adds poor quality water to the West Branch Susquehanna River.

Drury Run (Figure 21) has poor water quality due to the effects of acid mine drainage: concentrations of chemical parameters are excessive and macroinvertebrate populations are reduced (McMorran, 1985a). One tributary, Sandy Run, is partially degraded: few fish are present and there are moderately high concentrations of aluminum and acidity, and no alkalinity (PaDER, 1986). Natural acidity, acid mine drainage and/or acid precipitation may be contributing to this degradation.

Paddy Run, Young Womans Creek, Hyner Run, Baker Run and Lick Run (Figure 21) are small streams that drain forested, undeveloped watersheds. Water quality is excellent and one stream, Paddy Run, is utilized as a water supply source by the Borough of Renovo. These streams have a beneficial effect on the West Branch Susquehanna River, but their volumes of flow are not large enough to cause any significant recovery in the West Branch (McMorran, 1985a).

Tangascootack Creek (Figure 21) has fair quality water (McMorran, 1985a). The watershed is mainly forested and

undeveloped, but mining in the watershed has resulted in acid mine drainage degradation to nine miles of the stream.

Near Lock Haven, Bald Eagle Creek enters the West Branch. Sayers Lake , an impoundment on Bald Eagle Creek, stores alkaline water that is released in controlled flows to neutralize the acidity in the West Branch. As a result of this management of water resources, good water quality has been restored to the lower 60 miles of the West Branch (McMorran, 1985a) (Figure 23 and 24). Healthy fish and macroinvertebrate communities are present throughout the lower West Branch Susquehanna River.

Bald Eagle Creek (Figure 22) drains a valley underlain by carbonate rocks and subject to agricultural uses. Consequently, it has high concentrations of nutrients and thus high biological productivity (SRBC, 1984). Stream quality is good but the high productivity causes eutrophic conditions and reduced concentrations of dissolved oxygen in Sayers Lake. This impoundment was constructed to provide flood control and recreation. The alkaline water stored in Sayers Lake is released in order to neutralize acidic water in the West Branch Susquehanna River. Bald Eagle Creek is the principal contributor of good quality water to the West Branch and is responsible for the recovery of the good water quality there.

Fishing Creek (Figure 22) is a tributary to Bald Eagle Creek. It has excellent quality water and high biological productivity (McMorran, 1985a). Beech Creek (Figure 22) is degraded for 24 miles, most of its length, by acid mine drainage (Gannett Fleming, 1970). Even though the stream carries a large

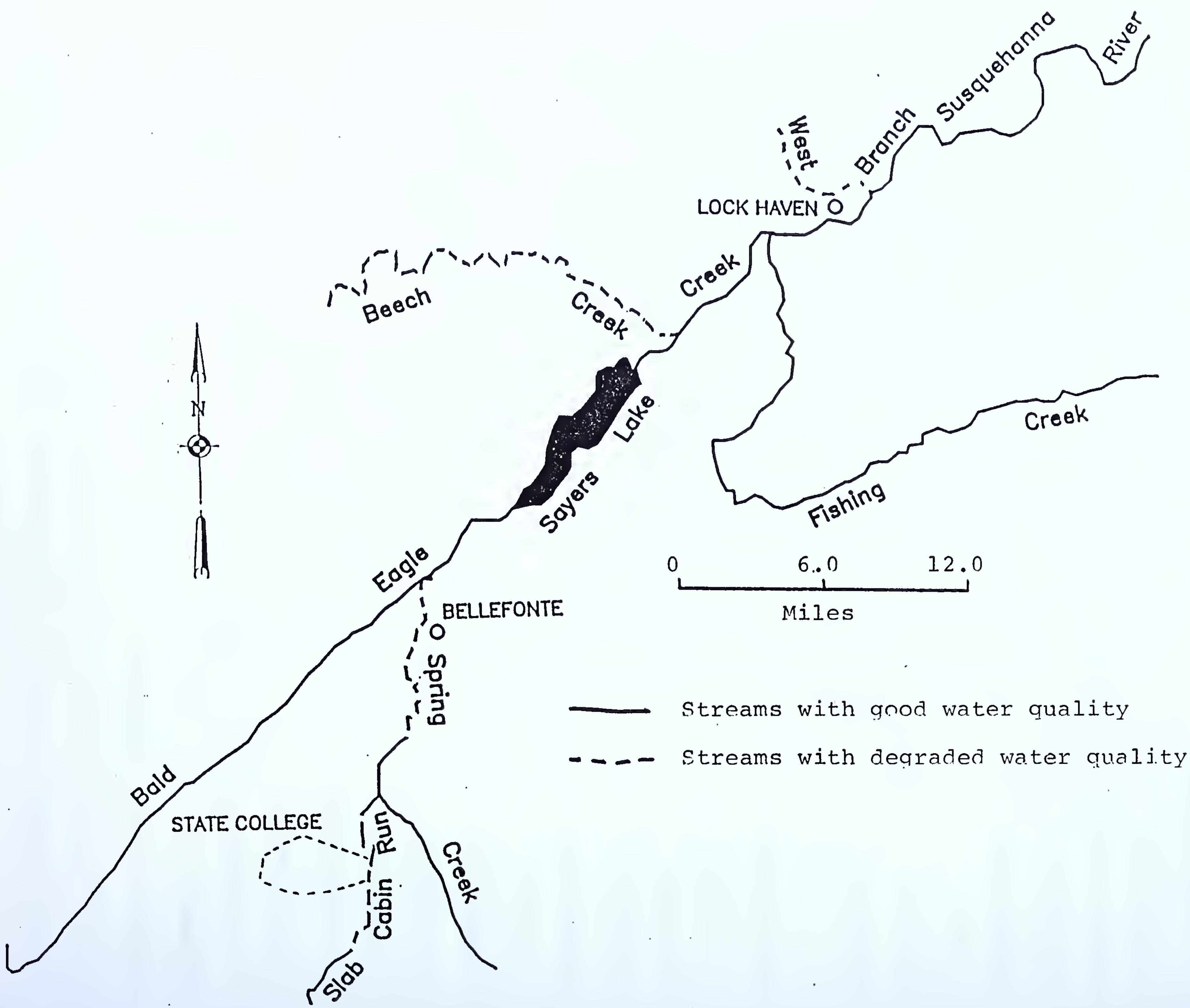


FIGURE 22 - WATER QULAITY OF THE BALD EAGLE CREEK WATERSHED

acid load, it has only a localized impact on Bald Eagle Creek (McMorran, 1985a).

Spring Creek (Figure 22) is another tributary to Bald Eagle Creek. It is a highly productive limestone stream and stream conditions indicate good quality (McMorran, 1985a). However, it receives municipal and industrial wastes and the lower reach of the stream has been posted with advisories regarding consumption of fish due to pesticide contamination. Other problems are related to siltation, nutrient enrichment and sewage. A tributary to Spring Creek, Slab Cabin Run, is degraded due to a municipal discharge from Ferguson Township (PaDER, 1986). The treatment plant fails to meet acceptable limits for ammonia and bacteria.

McElhattan Run (Figure 23) drains a forested watershed. No sources of degradation exist and the stream has excellent water quality (McMorran, 1985a). Two reservoirs on the stream provide water supply for the city of Lock Haven.

Chatham Run (Figure 23) is a small stream with good water quality (McMorran, 1985a). Minor degradation indicative of faulty on-lot septic systems is present, however, fish and macroinvertebrate populations are healthy indicating a lack of stress.

Pine Creek (Figure 23) is one of the largest tributaries to the West Branch Susquehanna River. The watershed is relatively undeveloped, therefore there are few impacts by man. Pine Creek has good water quality and healthy fish and macroinvertebrate communities throughout its length and has a beneficial impact on the West Branch Susquehanna River (McMorran, 1985a).

However, several tributaries to Pine Creek have water quality problems. Marsh Creek is degraded for five miles due to inadequately treated sewage from Wellsboro (PaDER, 1986). Babb Creek has excellent water quality upstream of Lick Run. However, acid mine drainage severely degrades 14 miles of the stream from Lick Run downstream to its confluence with Pine Creek (Boyer Krantz, 1976). Wilson Creek is a tributary to Babb Creek that is also degraded by acid mine drainage.

Little Pine Creek contributes good water quality to Pine Creek (McMorran, 1985a). This stream is characterized by highly productive, alkaline water conditions. Two tributaries, Otter Run and English Run, are degraded by acid mine drainage but do not have significant impacts on Little Pine Creek (PaDER, 1986).

Antes Creek (Figure 23) is underlain by carbonate rocks and flows underground for several miles. As a result, the quality of water in Antes Creek differs from other streams. Antes Creek has very high concentrations of alkalinity and other dissolved constituents that result in very productive conditions. Although Antes Creek is not a large tributary to the West Branch Susquehanna River, it is a major contributor of alkalinity and nutrients. Its water quality is considered good since no stress on aquatic life has been observed (McMorran, 1985a).

Larrys Creek (Figure 23) has good quality water (McMorran, 1985a). Fish and macroinvertebrate communities are healthy, although high bacteria levels may be an indication of malfunctioning on-lot septic systems.

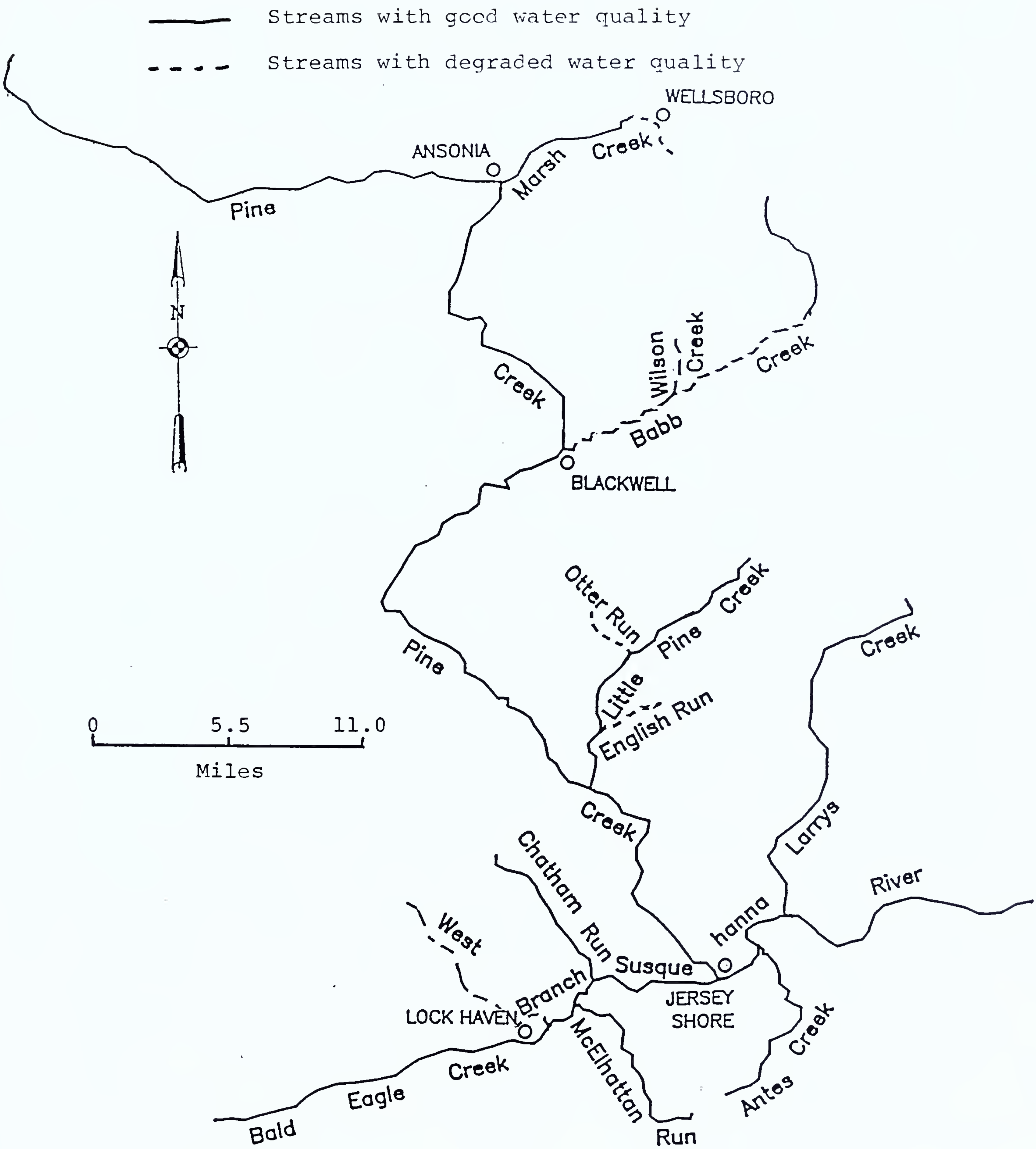


FIGURE 23 - WATER QUALITY OF THE WEST BRANCH SUSQUEHANNA RIVER WATERSHED BETWEEN BALD EAGLE CREEK AND LARRYS CREEK (INCLUSIVE)

Mosquito Creek (Figure 24) drains a forested and undeveloped watershed. Water quality is excellent (McMorran, 1985a) and the upper reach of the stream is the site of a water supply reservoir for the City of Williamsport. The lower reach is impacted by suburban development and shows signs of receiving pollutants from malfunctioning septic systems and urban runoff. However, fish and macroinvertebrate communities are healthy throughout the stream.

Lycoming Creek (Figure 24) is one of the larger tributaries to the West Branch Susquehanna River. Water quality in its upper reaches is good to excellent (McMorran, 1985a). Approximately two miles of Red Run are degraded due to acid mine drainage (PaDER, 1986). Minor impacts are present at scattered locations on Lycoming Creek due to malfunctioning on-lot septic systems, but fish and macroinvertebrate communities throughout most of the stream length are healthy, thus indicating good water quality. Historical data show good water quality, but declining trends for pH and alkalinity. This may be indicative of the effects of acid precipitation. The downstream reach of Lycoming Creek flows through the City of Williamsport, where high bacteria counts indicate inadequate sewage collection and treatment. Fish and macroinvertebrate populations are also reduced here due to habitat loss from channelization of the stream for flow control purposes.

Loyalsock Creek (Figure 24) drains a forested, undeveloped watershed and is naturally infertile (McMorran, 1985a). The major source of degradation is acid mine drainage which impacts

Loyalsock Creek from Lopez to Pole Bridge Run. Water quality recovers throughout the rest of Loyalsock Creek, although localized effects of malfunctioning septic systems occur.

Muncy Creek, White Deer Hole Creek and White Deer Creek (Figure 24) are tributaries to the West Branch Susquehanna River that have good water quality (McMorran, 1985a). Most of the agricultural and residential development in these watersheds is found in the lower reaches of these streams. The majority of the watershed areas are forested and the lack of development results in excellent water quality in the streams.

Buffalo Creek (Figure 24) drains widespread agricultural areas and receives nutrient enrichment from agricultural runoff (McMorran, 1985a). The headwaters are located in forested, mountain areas but much of the stream flows through the Buffalo Valley that is underlain by limestone. Fish and macroinvertebrate communities are healthy but indicate downstream eutrophication. Water quality is good, but signs of malfunctioning on-lot septic systems and agricultural runoff are present, indicated by high bacteria counts and excessive nutrients.

Chillisquaque Creek (Figure 24) is similar to Buffalo Creek since it drains a similar geological area. Intensive agricultural activity on soils derived from carbonate bedrock results in eutrophic stream conditions. Water quality throughout most of Chillisquaque Creek is good (McMorran, 1985a). Two miles of stream are degraded due to the discharge from Pennsylvania Power and Light's Montour Generating Station. This discharge has

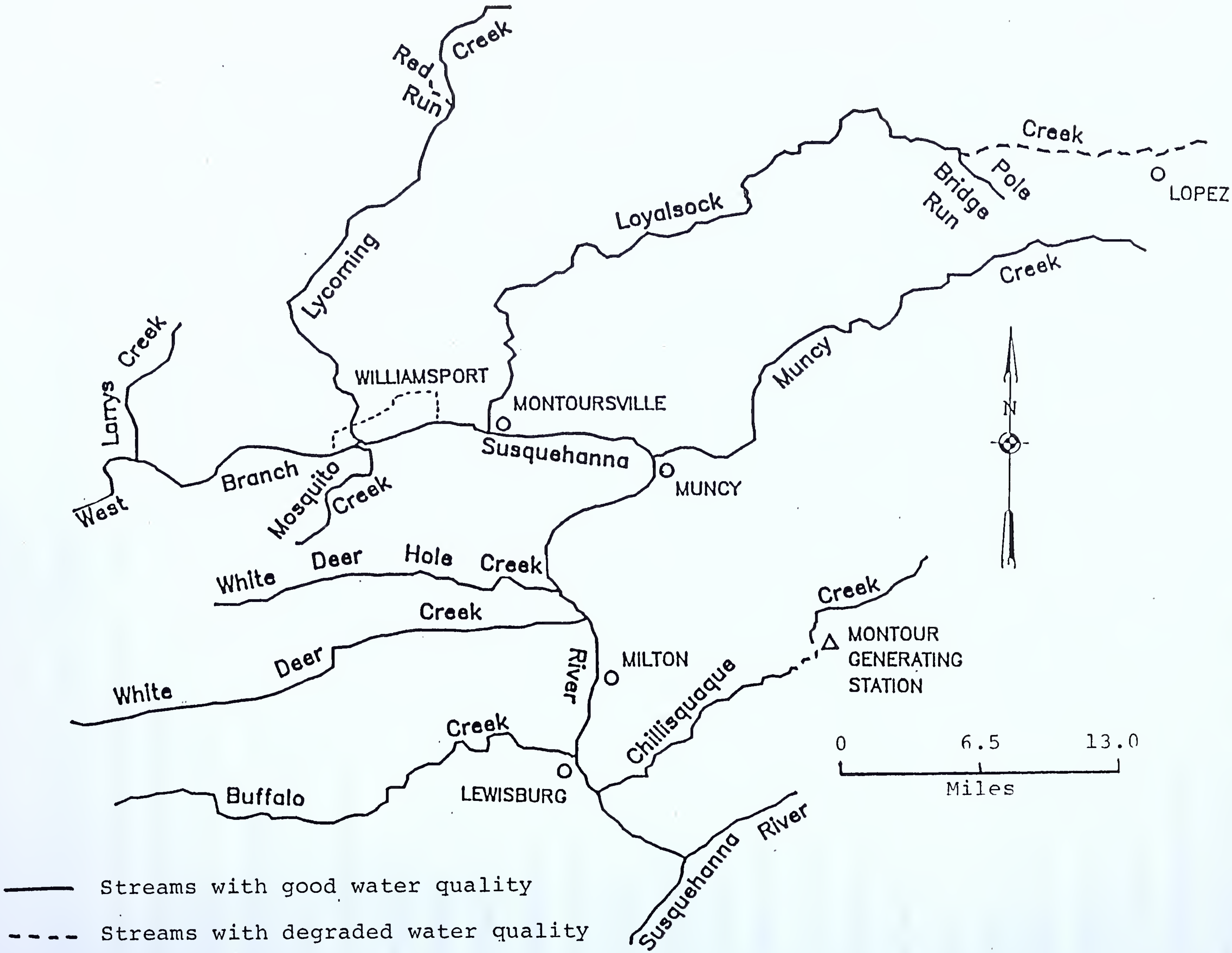


FIGURE 24 - WATER QUALITY OF THE WEST BRANCH SUSQUEHANNA RIVER WATERSHED BETWEEN LARRYS CREEK AND THE SUSQUEHANNA RIVER

high levels of dissolved metals and occasional high levels of ammonia that causes reduced macroinvertebrate diversity. However, the stream recovers quickly and contributes good water quality to the West Branch Susquehanna River.

JUNIATA SUBBASIN

The Juniata River drains an area of 3404 square miles in the southwestern part of the Basin (Figure 25). Approximately half of this area is drained by the three major tributaries, Raystown Branch Juniata River, Frankstown Branch Juniata River and Little Juniata River.

Frankstown Branch Juniata River (Figure 26) has excellent water quality from its headwaters downstream to Halter Creek (PaDER, 1986). Halter Creek is degraded by paper mill effluent and this degradation carries down into Frankstown Branch Juniata River. Halter Creek is also degraded by the waters received from Plum Creek. Plum Creek receives the discharge from the Martinsburg STP. Chlorine toxicity has been observed for one half mile downstream of the STP (PaDER, 1986). Eutrophic conditions are present further downstream.

Frankstown Branch Juniata River also receives degraded waters from Beaverdam Branch Juniata River (McMorran, 1986a). The stream is degraded by acid mine drainage from Burgoon Run and Sugar Run, and industrial and municipal waste loads from the Altoona area (PaDER, 1986). The Altoona West STP degrades the stream with high levels of zinc and chlorine. Waste loads from the Duncansville and Holidaysburg STP's also contribute to the

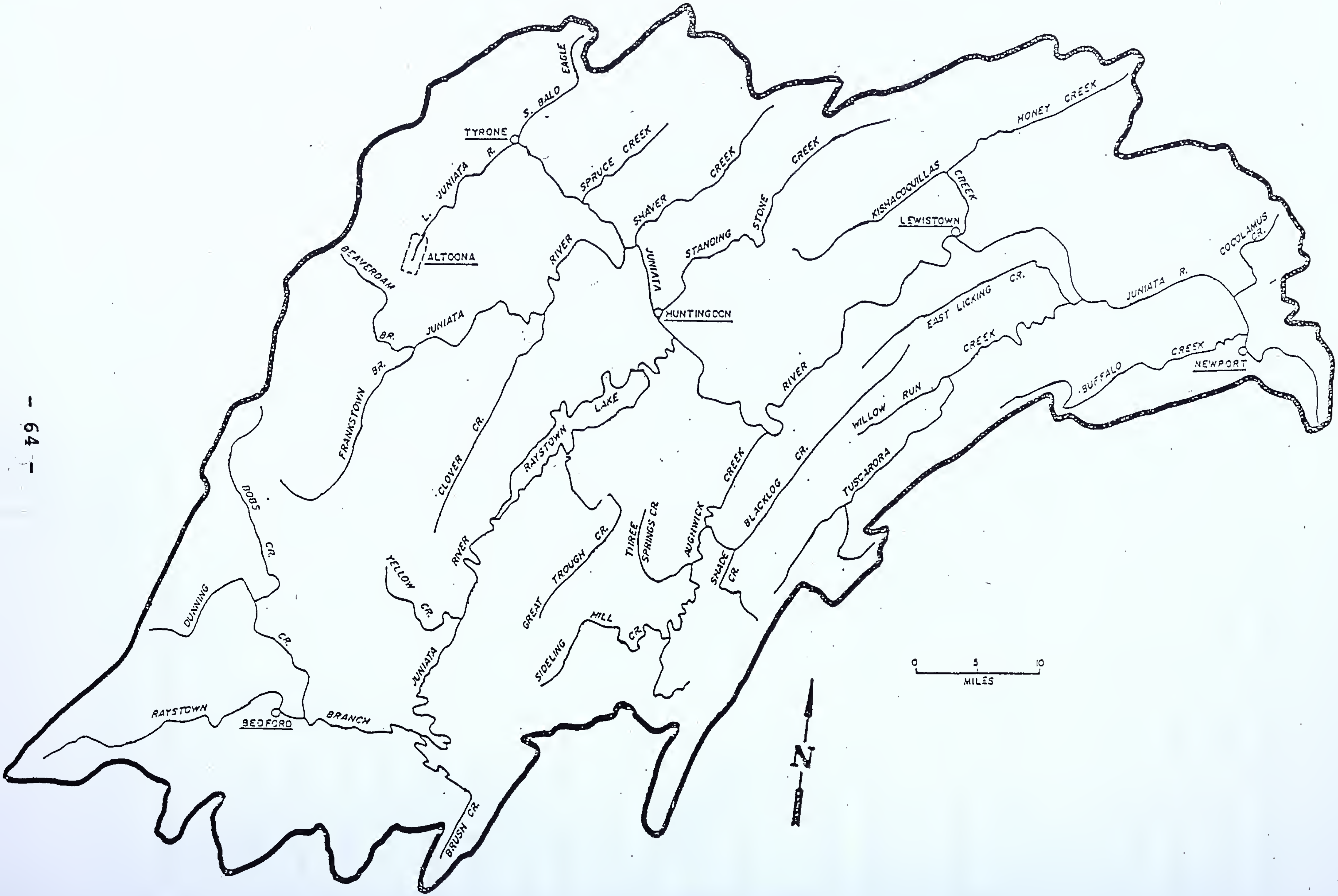


FIGURE 25 - JUNIATA SUBBASIN

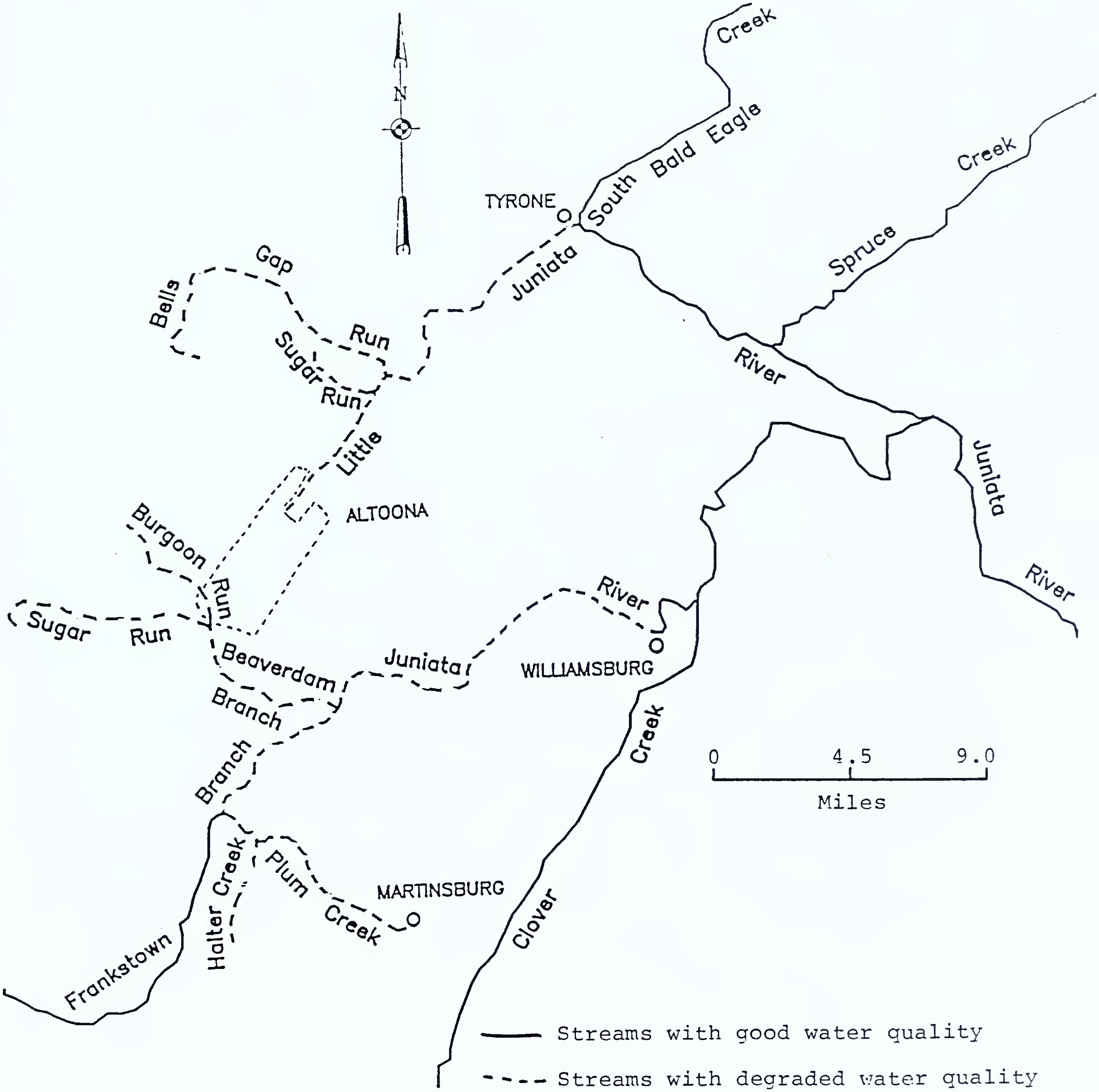


FIGURE 26 - WATER QUALITY OF THE LITTLE JUNIATA RIVER AND FRANKSTOWN BRANCH JUNIATA RIVER WATERSHEDS

problem. The poor quality conditions in Frankstown Branch Juniata River begin to improve downstream of Beaverdam Branch but signs of degradation are still present at Williamsburg. The stream receives good quality water from Clover Creek (McMorran, 1986a) although this stream also experiences problems due to agricultural runoff (SCS, 1983). Frankstown Branch Juniata River is degraded for 12 miles but recovers good quality water between Clover Creek and its confluence with the Little Juniata River.

The Little Juniata River (Figure 26) has degraded water quality in its upper reaches from Altoona and Tyrone industrial and municipal waste discharges, landfill leachate from Sugar Run, and acid mine drainage from Bells Gap Run (Rider and Conrad, 1986a). These problems cause poor water quality and reduced fish and macroinvertebrate populations. However, these reaches have improved over the past twenty years due to pollution control measures. Downstream of Tyrone, the Little Juniata River receives flows of good quality water from South Bald Eagle Creek and Spruce Creek (McMorran, 1986a). As a result, the Little Juniata River also has good water quality at its confluence with the Frankstown Branch Juniata River.

Raystown Branch Juniata River (Figure 27) has shown improvement of water quality over the past 20 years. Degraded conditions existed between Bedford and Saxton due to discharges of untreated sewage from these communities and the community of Everett. The construction of treatment facilities has improved this problem but degradation still occurs in five miles of stream near Everett, Schellsburg, and Manns Choice (Kime, 1985c). High

bacteria levels are present in other reaches of Raystown Branch Juniata River indicating sources ranging from malfunctioning on-lot septic systems to agricultural runoff. However, Raystown Branch Juniata River supports healthy fish and macroinvertebrate communities throughout its length, indicative of good water quality (McMorran, 1986a).

Raystown Lake (Figure 27) is a large impoundment on Raystown Branch Juniata River. Due to its large size the lake, as a whole, is oligotrophic (nutrient limited). The upstream end shows signs of eutrophication due to the nutrient load carried in by the river (PaDER, 1986). Downstream of the dam, Raystown Branch Juniata River is impoverished because most of the nutrients present in the river are taken up by biological and sedimentation processes in Raystown Lake (McMorran, 1986a).

Dunning Creek (Figure 27) experiences water quality degradation due to untreated sewage discharges from Fishertown via Adams Run (Kime, 1985b). A total of one mile of Adams Run and Dunning Creek is degraded by this source. In addition, high bacteria levels are present at other locations along Dunning Creek and its major tributary, Bobs Creek (McMorran, 1986a). However, both streams support healthy fish and macroinvertebrate communities and have good water quality in most reaches.

Brush Creek (Figure 27) has good quality water (McMorran, 1986a). No chemical problems have been documented, although siltation may be a local problem in the stream. Fish and macroinvertebrate communities are healthy indicating a lack of water pollution stress.

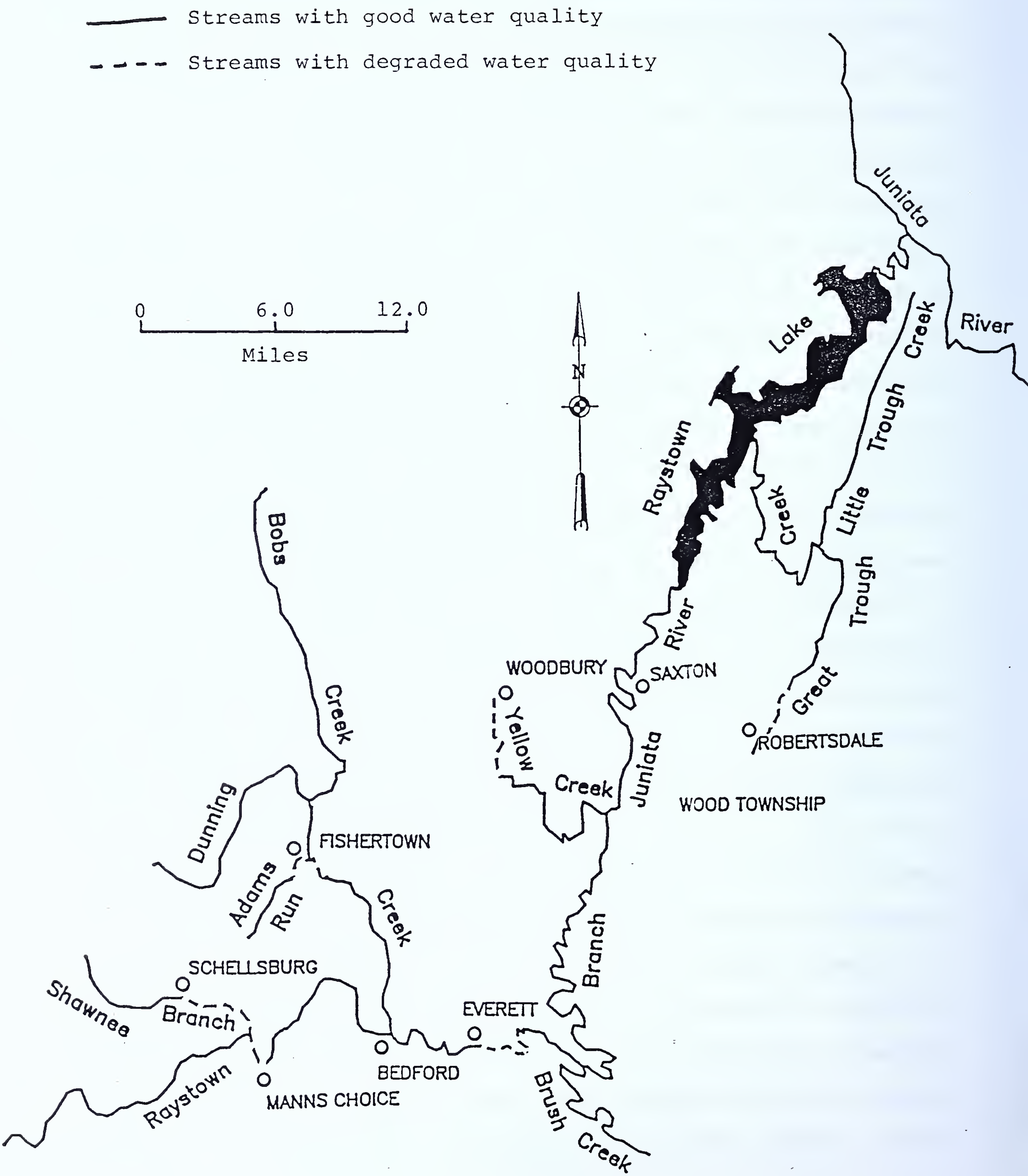


FIGURE 27 - WATER QUALITY OF THE RAYSTOWN BRANCH JUNIATA RIVER WATERSHED

Yellow Creek (Figure 27) is degraded for four miles by raw sewage discharges and malfunctioning on-lot systems in South Woodbury Township (PaDER, 1986). Siltation occurs due to agricultural runoff, but impacts on the stream appear to be minor since healthy fish and macroinvertebrate communities are present.

Great Trough Creek (Figure 27) is degraded for three miles by a raw sewage discharge from Wood Township (PaDER, 1984d). This discharge occurs near the headwaters where, at times, due to low natural flows, most of the surface flow results from these discharges. These low natural flows may be due to the effects of past deep coal mining. Deep mines, constructed to drain away water, reduce groundwater levels. Great Trough Creek recovers as it flows past Robertsdale and at its confluence with Little Trough Creek, fish and macroinvertebrate communities are indicative of good water quality. The stream has excellent quality water between Little Trough Creek and Raystown Branch Juniata River (McMorran, 1986a).

The Juniata River is formed by the confluence of the Little Juniata River and the Frankstown Branch Juniata River. The Juniata River is characterized by high concentrations of nutrients and minerals and is a highly productive river (McMorran, 1986a). Diverse and abundant fish and macroinvertebrate communities are present throughout the Juniata River, further evidence of the high productivity of the river. The concentrations of chemical parameters are not so high as to be excessive and do not cause degradation of water quality. The Juniata River has good water quality throughout its length (Figures 28 and 29).

Shaver Creek (Figure 28) contributes good quality water to the Juniata River (McMorran 1986a). Minor problems related to agricultural runoff have been reported (PaDER, 1986)but healthy fish and macroinvertebrate populations are present indicating a lack of stress.

Standing Stone Creek (Figure 28) has excellent water quality (McMorran, 1986a). Past reports mention minor problems due to agricultural runoff (PaDER, 1986), but few impacts have been recorded by recent studies. Fish and macroinvertebrate communities are diverse and abundant and show no signs of stress.

Aughwick Creek (Figure 28) and its tributaries have excellent water quality (McMorran, 1986a). Concentrations of chemical parameters are low and fish and macroinvertebrate populations are diverse and abundant. One small area of localized degradation exists on the lower reach of Three Springs Creek (PaDER, 1984f). The construction of an STP serving the boroughs of Saltillo and Three Springs is expected to remedy this problem.

Kishacoquillas Creek (Figure 29) has water quality problems that originate from several sources. The reaches of the stream upstream of the confluence with Honey Creek have good water quality (McMorran, 1986a). Degradation in Kishacoquillas Creek and Honey Creek is minor and originates from agricultural runoff. The lower five miles of Kishacoquillas Creek are degraded by discharges from municipal and industrial facilities near Lewistown. Degradation caused by oil, heavy metals, high bacteria levels and excess nutrients have plagued the reach since

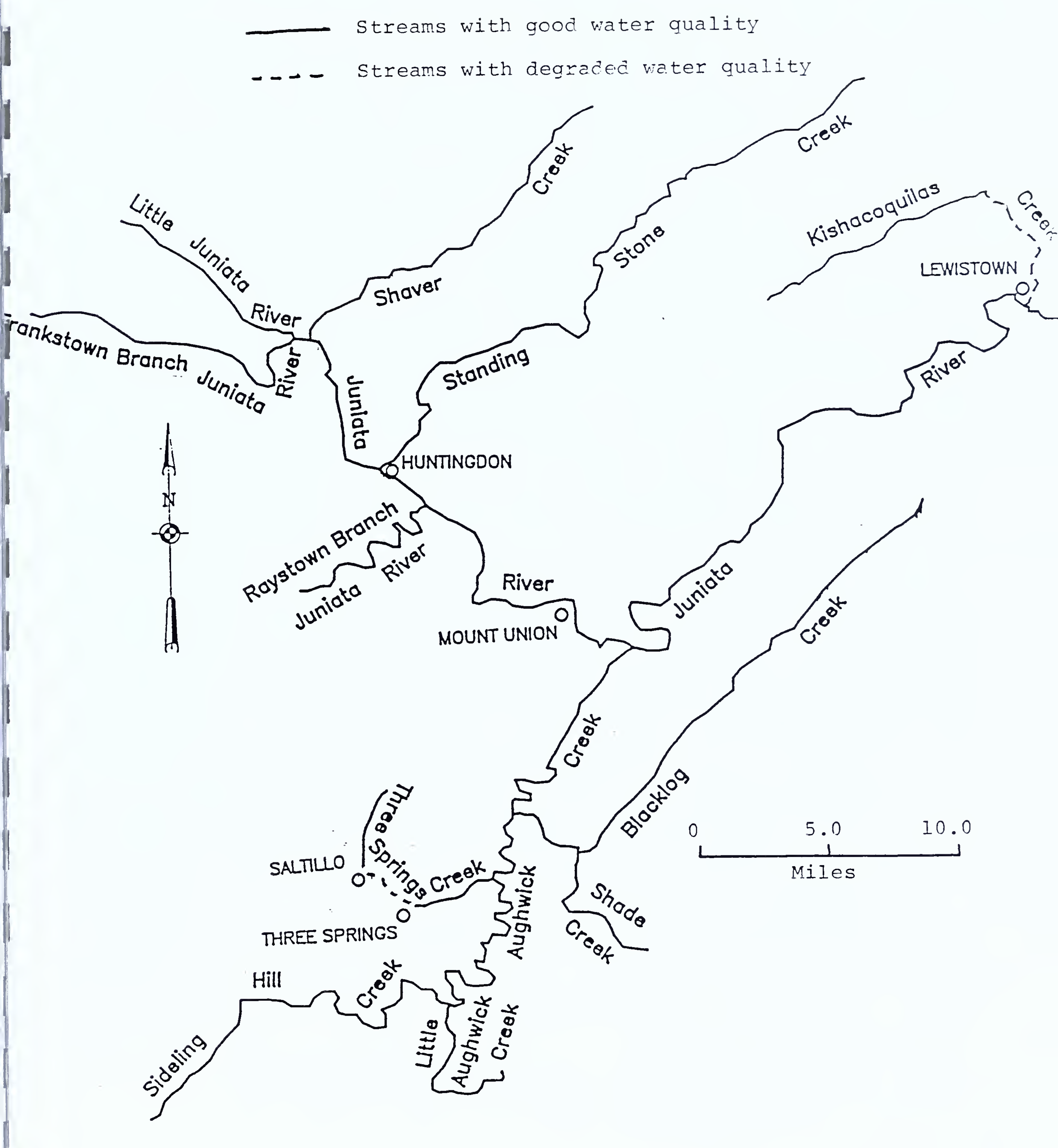


FIGURE 28 - WATER QUALITY OF THE JUNIATA RIVER WATERSHED BETWEEN SHAVER CREEK (INCLUSIVE) AND KISHACOQUILAS CREEK

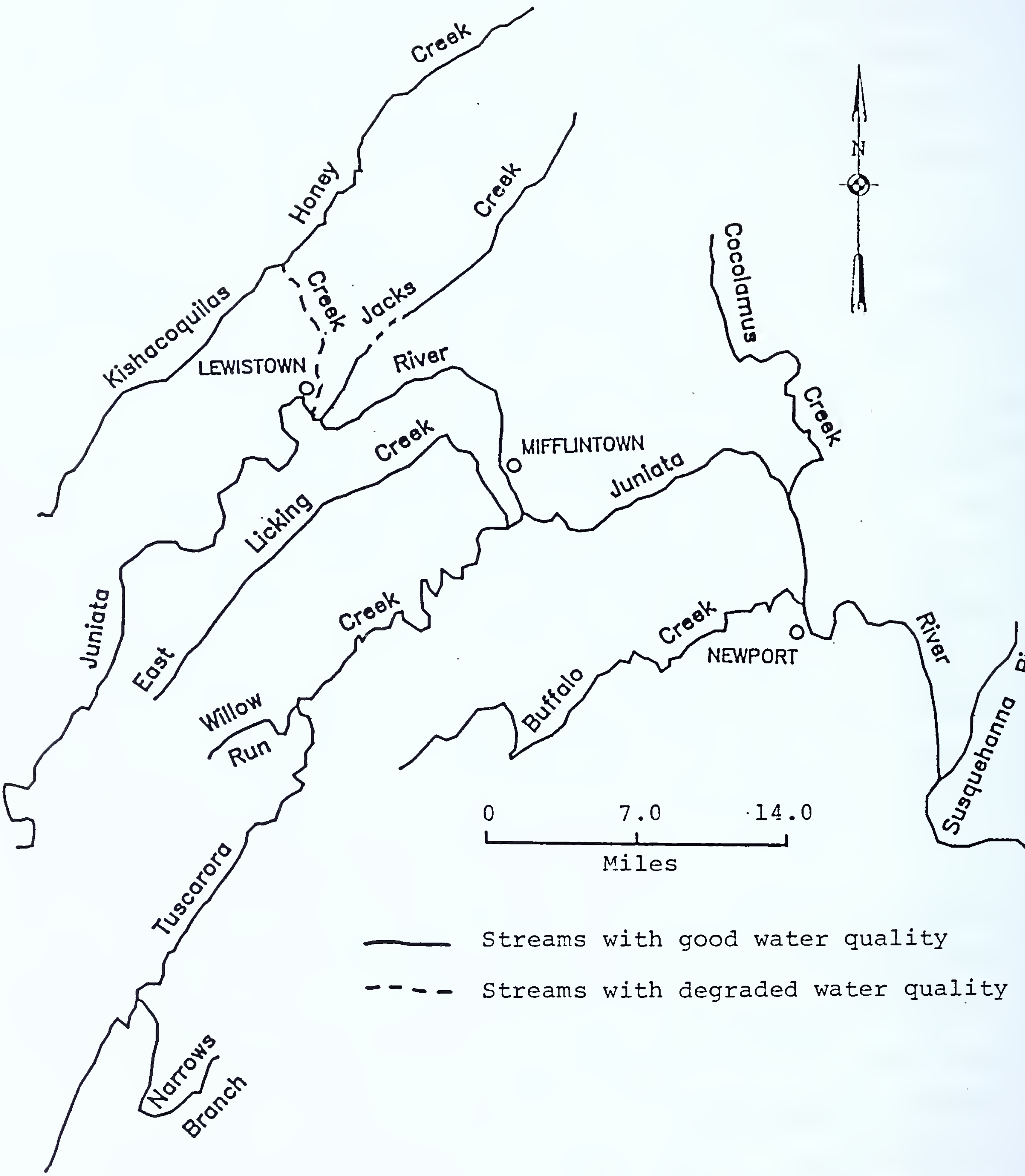


FIGURE 29 - WATER QUALITY OF THE JUNIATA RIVER WATERSHED BETWEEN KISHACOQUILAS CREEK (INCLUSIVE) AND THE SUSQUEHANNA RIVER

the 1950's. Kishacoquillas Creek contributes poor quality water to the Juniata River.

Water quality in Jacks Creek (Figure 29) is good (PaDER, 1986a). Seven miles upstream from its confluence with the Juniata River is a site where leachate from an old dump site enters the stream. Partial degradation of one half mile of stream occurs due to high concentrations of metals.

Tuscarora Creek (Figure 29) and its tributaries, Narrows Branch Tuscarora Creek, Willow Run and East Licking Creek, all have excellent water quality (McMorran, 1986a). This watershed is entirely rural and thus has few activities that adversely affect water quality. Agricultural runoff is the only source of any pollution and this does not appear to cause any significant problems.

Cocolamus Creek (Figure 29) contributes excellent water quality to the Juniata River (McMorran, 1986a). There is no documentation of any water quality problems occurring in the watershed. Good water quality is evidenced by abundant and diverse fish and macroinvertebrate communities.

Buffalo Creek (Figure 29) has good quality water (McMorran, 1986a). High bacteria levels are the only problem recorded and can be attributed to agricultural runoff. Fish and macroinvertebrate populations are healthy and show no signs of water pollution stress.

LOWER SUSQUEHANNA SUBBASIN

The Lower Susquehanna Subbasin includes the southeastern part of the Basin from the confluence of the Susquehanna River

and the West Branch Susquehanna River at Northumberland, Pennsylvania to the Chesapeake Bay at Havre de Grace, Maryland (excluding the Juniata Subbasin) (Figure 30). The Lower Susquehanna Subbasin is the most intensively developed area of the Basin. It holds approximately one-third of the Basin population and has the highest proportion of non-forest land.

Water quality in the Susquehanna River in this subbasin is good (McMorran, 1986b). From Northumberland to the Harrisburg area (Figure 31), it flows through sparsely populated areas and receives few discharges that affect water quality.

Shamokin Creek (Figure 31) is degraded by acid mine drainage and several municipal discharges in its headwaters (Gannett Fleming, 1972a; PaDER, 1986). Shamokin Creek is severely degraded for most of its length and contributes poor quality water to the Susquehanna River. However, tributaries in the western end of the Shamokin Creek watershed are not affected by acid mine drainage and have good water quality.

Mahanoy Creek (Figure 31) is also degraded for most of its length due to acid mine drainage in its upper reaches (PaDER, 1986; Sanders and Thomas, 1975). pH generally meets Pennsylvania water quality criteria but is highly variable and often drops below the minimum of 6.0. Few fish or macroinvertebrates can be found in Mahanoy Creek, indicating stressful water quality conditions. Metals, turbidity and suspended solids are extremely high and are also an indication of poor water quality conditions (McMorran, 1986b).

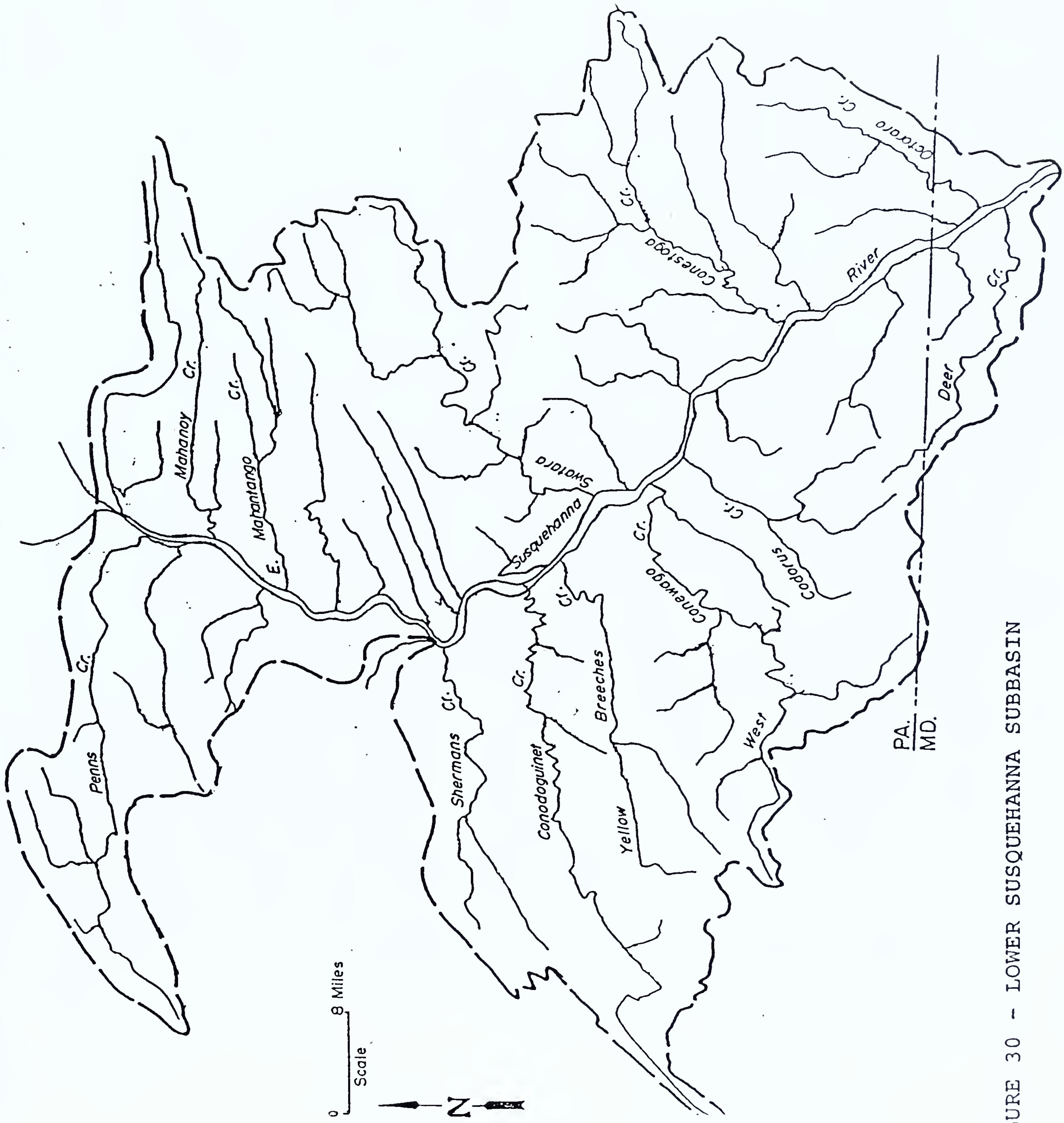


FIGURE 30 - LOWER SUSQUEHANNA SUBBASIN

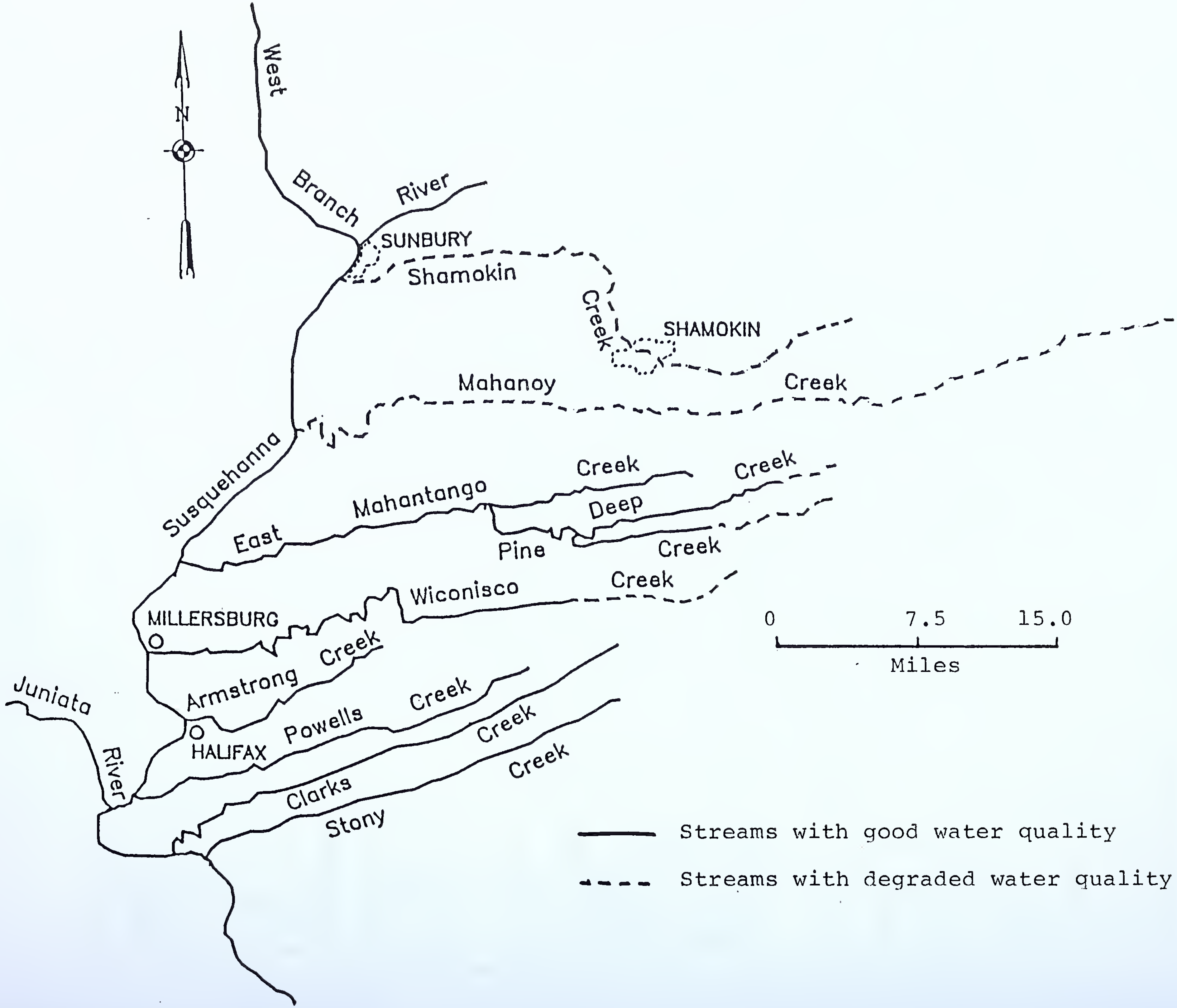


FIGURE 31 - WATER QUALITY OF THE EAST SHORE SUSQUEHANNA RIVER WATERSHED BETWEEN THE WEST BRANCH SUSQUEHANNA RIVER AND STONY CREEK (INCLUSIVE)

East Mahantango Creek (Figure 31) has good water quality (McMorran, 1986b). Fish and macroinvertebrate communities are healthy indicating a lack of stress. However, several tributaries, Deep Creek and Pine Creek, show partial degradation due to acid mine drainage.

Wiconisco Creek (Figure 31) was widely degraded in the past due to acid mine drainage in its upper reaches (Sanders and Thomas, 1973). This has been abated to some degree and much of the lower half of the stream now has good water quality as shown by healthy populations of fish and macroinvertebrates (McMorran, 1986b).

Armstrong Creek and Powells Creek (Figure 31) drain rural watersheds that have high proportions of forest land. Water quality is good in both streams (McMorran, 1986b). Agricultural runoff and on-lot septic systems are the only factors that affect water quality and no impacts from these sources have been documented. Both streams support cold water fisheries.

Clarks Creek and Stony Creek (Figure 31) drain adjacent watersheds and have similar characteristics. The streams are nutrient poor due to poor soil development in the narrow, rocky valleys. Clarks Creek is impounded to provide water supply for the city of Harrisburg. The headwaters of Stony Creek are impacted by acid mine drainage from abandoned coal mines (Gash and Friday, 1972). However, both streams have good water quality (McMorran, 1986b).

Penns Creek and its major tributaries (Middle Creek, Laurel Run, Elk Creek and Sinking Creek) (Figure 32) have excellent

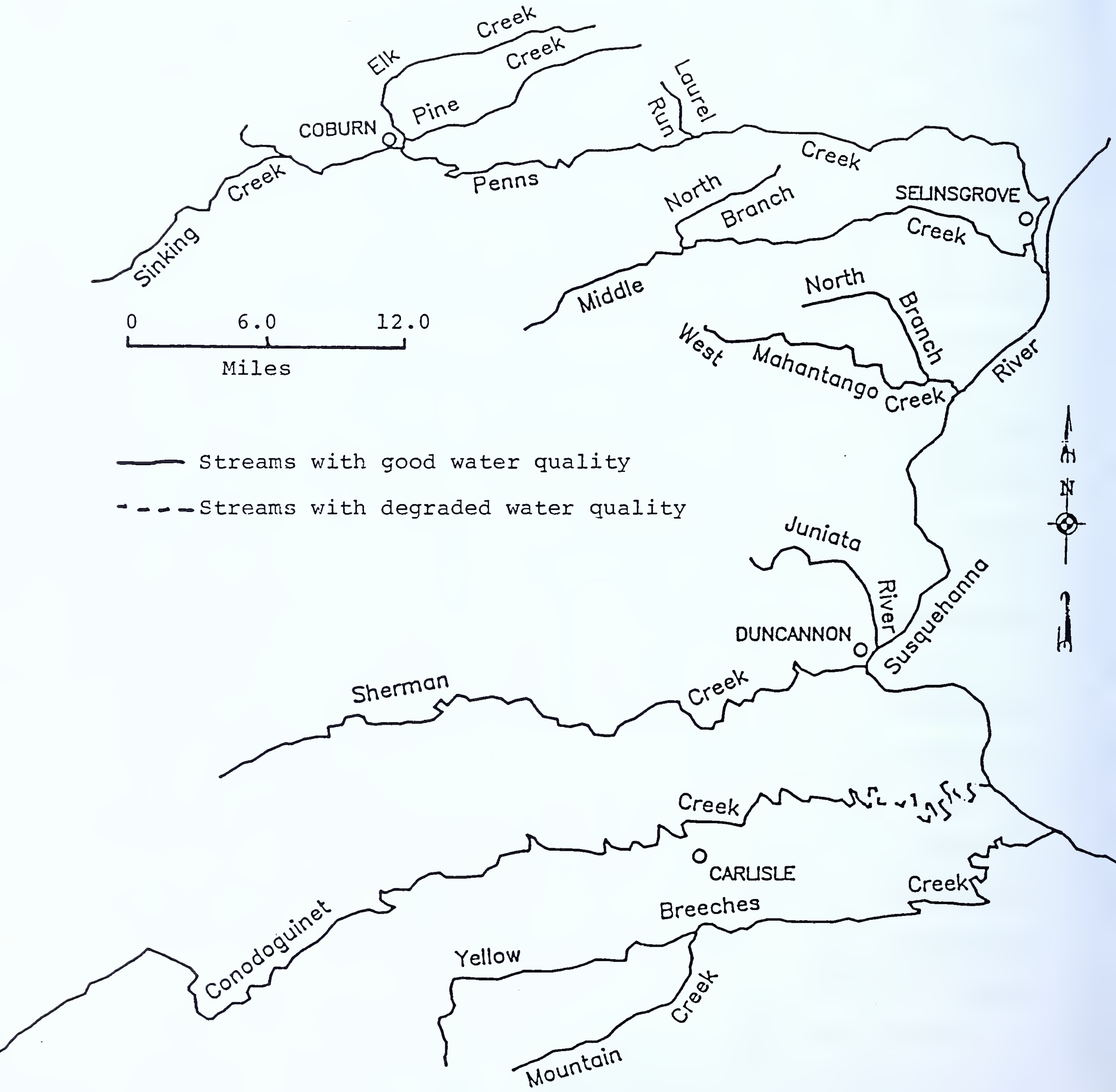


FIGURE 32 - WATER QUALITY OF THE WEST SHORE SUSQUEHANNA RIVER WATERSHED BETWEEN PENNS CREEK (INCLUSIVE) AND YELLOW BREECHES CREEK (INCLUSIVE)

water quality (McMorran, 1986b). Much of this watershed is state forest land thus providing a source of high quality waters. Some of the reaches where intensive agriculture occurs show increased biological productivity.

West Mahantango Creek (Figure 32) also has high water quality. It also is a rural watershed with few activities thathave a negative impact on water quality.

Shermans Creek (Figure 32) drains a rural watershed. No large point source discharges enter the stream although localized degradation may exist due to agricultural runoff and/or malfunctioning septic systems. Shermans Creek supports diverse and abundant fish and macroinvertebrate populations indicative of good water quality (McMorran, 1986b).

Conodoquinet Creek (Figure 32) drains a predominately rural watershed and has good water quality (McMorran, 1986b). However, dense suburban development near its confluence with the Susquehanna River degrades portions of the lower sixteen miles of the stream. There are six municipal discharges to Conodoquinet Creek between Carlisle and the Susquehanna River. These discharges contribute to reduced dissolved oxygen levels in Conodoquinet Creek, thus impairing designated uses for aquatic life.

Yellow Breeches Creek (Figure 32) is an excellent quality stream (McMorran, 1986b). The upstream reaches and tributaries flow through forested or agricultural areas and do not receive any degrading discharges. The lower reach flows through residential areas but maintains good water quality. The stream supports a very productive trout fishery.

The Harrisburg area is the largest metropolitan area in the Basin. In the past, the Susquehanna River suffered water quality degradation due to industrial and municipal discharges in this area (Rudisill, 1976). The quality of discharges in this reach has been improved and the river's water quality is good (Figure 33). Diverse and abundant macroinvertebrate and fish communities are present throughout the Susquehanna River between Northumberland and Three Mile Island, indicative of a lack of stress.

Paxton Creek (Figure 33) drains a heavily developed suburban area as well as most of the City of Harrisburg. The upper half of Paxton Creek has good water quality (McMorran, 1986b), although degradation due to urban runoff and sedimentation occurs during storm events. The lower half of Paxton Creek suffers severe degradation due to discharges of untreated sewage from Harrisburg. This degradation is being corrected with the completion of a new interceptor line currently under construction and the elimination of sewer outfalls into Paxton Creek.

Swatara Creek (Figure 33) is one of the larger tributaries to the Susquehanna River in this Subbasin. Swatara Creek has good water quality for most of its length (McMorran, 1986b), except for acid mine drainage degradation in its headwaters upstream of Pine Grove (Gannett Fleming, 1972b). One tributary, Quittapahilla Creek, was degraded in the past due to industrial and municipal discharges from the city of Lebanon (PaDER, 1986). Treatment of these discharges has resulted in improved water quality in Quittapahilla Creek. However, water quality problems

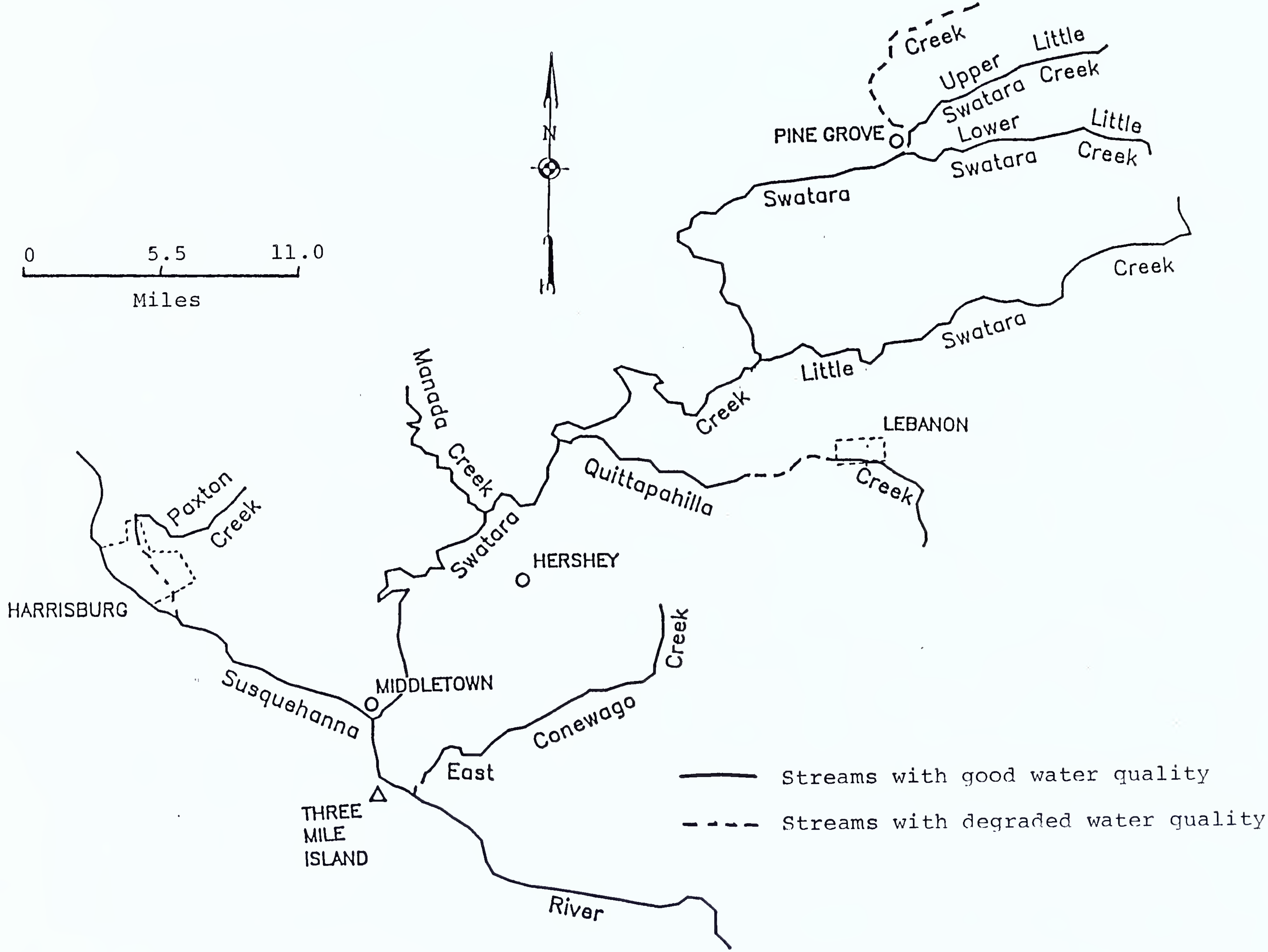


FIGURE 33 - WATER QUALITY OF THE PAXTON CREEK, SWATARA CREEK AND EAST CONEWAGO CREEK WATERSHEDS

still exist due to nutrient enrichment and excessive turbidity and suspended solids from agricultural runoff, and from metals contamination near Bethlehem Steel.

East Conewago Creek (Figure 33) has good water quality for most of its length (McMorran, 1986b). However, the lower mile is extremely degraded by poorly treated sewage from Cedar Manor (PaDER, 1986). Action is under way to upgrade this treatment facility.

West Conewago Creek (Figure 34) has good water quality for most of its length, however, pollution problems have been documented for several tributaries (McMorran, 1986b). Beaver Creek is severely degraded by on-lot and unpermitted sewage discharges in the Abbottstown area (Kime, 1985a). Anoxic conditions and heavy plant growth resulting from the effects of these discharges degrade 1.5 miles of stream. Bowers Run is a small tributary that receives municipal discharges from Biglerville (PaDER, 1986). This discharge degrades one half mile of stream, however, construction of an STP is in progress. West Conewago Creek and its tributaries (Opossum Creek, South Branch Conewago Creek, Bermudian Creek and Little Conewago Creek) support diverse and abundant fish and macroinvertebrate populations indicative of a lack of pollution stress.

All of the lower 25 miles of Codorus Creek (Figure 34) are degraded due to the discharge from the Glatfelter pulp mill in Spring Grove (McMorran, 1986b; PaDER, 1986). Color problems are obvious between Spring Grove and the Susquehanna River. Solids limit the biological condition of the stream for four miles below

the discharge. Municipal discharges from the City of York STP have impacts on Codorus Creek, but construction to upgrade this plant has begun.

The South Branch Codorus Creek also is partially degraded due to erosion, sedimentation and nutrient enrichment resulting from poor agricultural practices (PaDER, 1986). However, impacts on aquatic life are not severe and good water quality is present throughout most of the stream. This stream is a stocked trout stream and a water supply source for the City of York.

The lower reach of the Susquehanna River (Figure 35) is the site of nine major electricity producing facilities (Table 1). The hydroelectric impoundments have the greatest effect on water quality in the lower Susquehanna River. During summer when water temperatures rise and low flows result in longer retention times, reduced levels of dissolved oxygen develop in the impoundments and are discharged to the flowing reaches below the dams (MdDNR, 1986; Rudisill and Senko, 1980). The reduced dissolved oxygen levels impair designated uses for aquatic life, primarily fish. Water quality in the lower Susquehanna River is also representative of the agricultural runoff and municipal discharges upstream. Elevated nutrient concentrations, heavy metals, herbicides and pesticides have been found in water samples, but are within allowable limits.

Chickies Creek (Figure 35) is partially degraded for most of its length due to agricultural runoff (PaDER, 1986). Degradation occurs due to nutrient enrichment, turbidity and suspended solids. Biological conditions are depressed indicating only fair water quality (McMorran, 1986b).

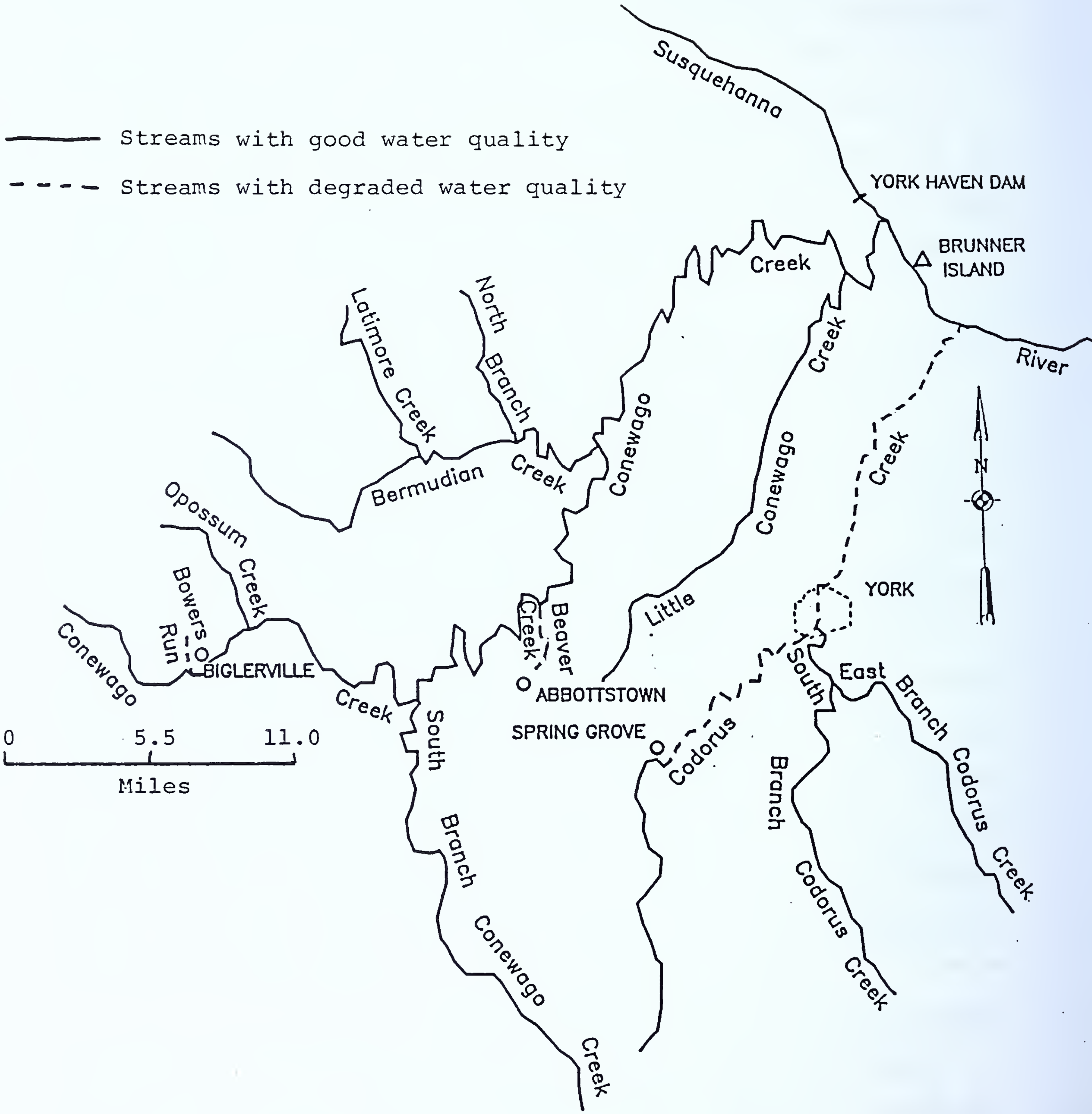


FIGURE 34 - WATER QUALITY OF THE WEST CONEWAGO CREEK AND CODORUS WATERSHEDS

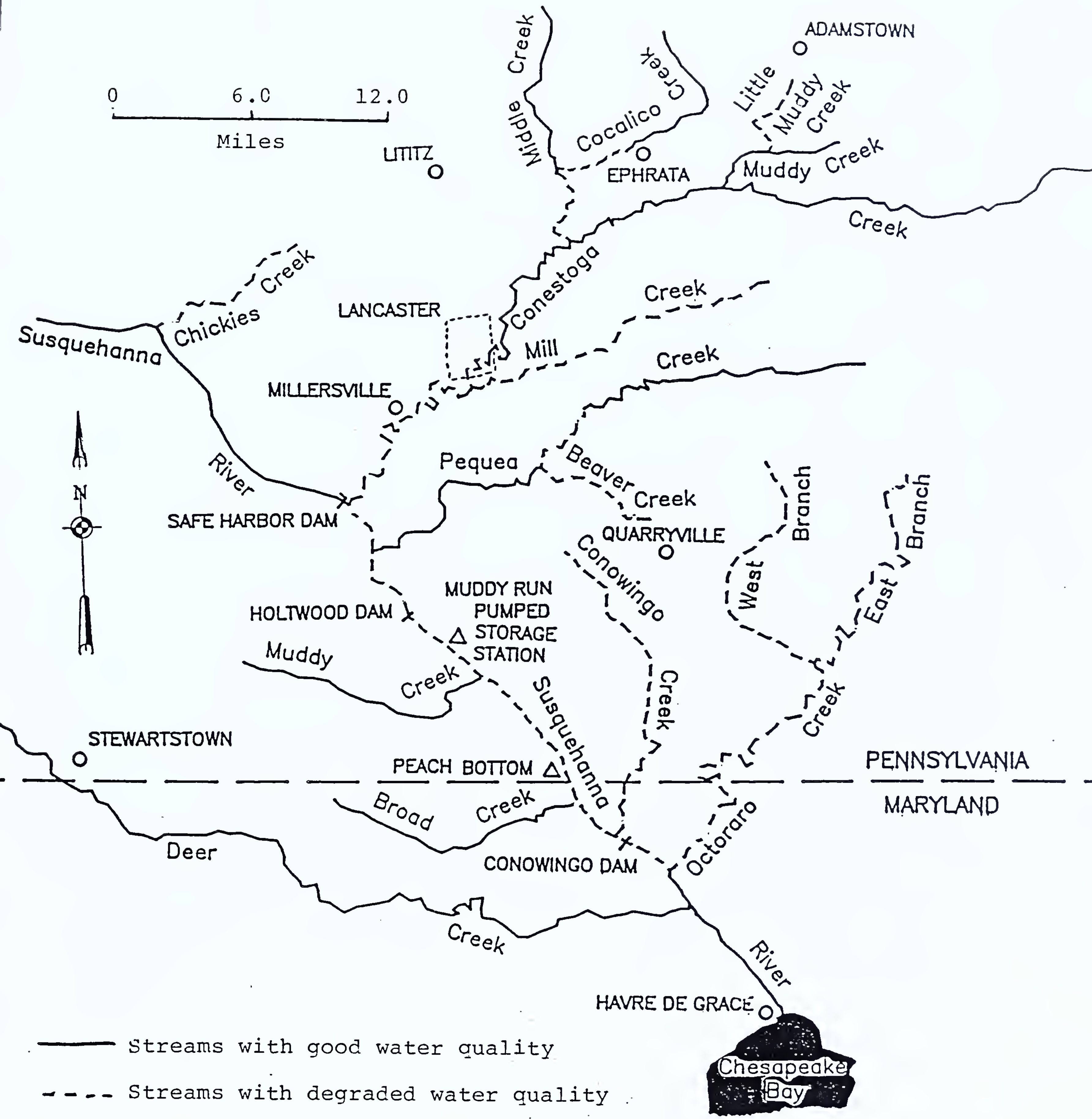


FIGURE 35 - WATER QUALITY OF THE SUSQUEHANNA RIVER WATERSHED DOWNSTREAM OF CHICKIES CREEK (INCLUSIVE)

TABLE 1

ELECTRICITY GENERATING STATIONS ON THE LOWER SUSQUEHANNA RIVER

STATION	TYPE
Three Mile Island	Nuclear
York Haven	Hydroelectric
Brunner Island	Coal
Safe Harbor	Hydroelectric
Holtwood	Hydroelectric
Holtwood	Coal
Muddy Run	Pumped Storage
Peach Bottom	Nuclear
Conowingo	Hydroelectric

The Conestoga Creek watershed (Figure 35) is one of the most intensively developed areas in the Basin. Urban and suburban development is widespread around Lancaster, Lititz, Ephrata and Millersville. Outlying areas are occupied with single residences and small farms. Agricultural development of the watershed is heavy and agricultural runoff contributes to degraded water quality in the lower 25 miles of Conestoga Creek (McMorran, 1986b; PaDER, 1986). The stream is characterized by high sediment loads, high nutrient levels and high bacterial levels.

Several tributaries to Conestoga Creek also have water quality problems (McMorran, 1986b; PaDER, 1986). Three miles of Mill Creek are badly degraded due to a combination of municipal and industrial discharges from New Holland that cause extreme eutrophication, BOD loading and suspended solids. Another 18 miles is degraded by nutrient enrichment from agricultural runoff.

Cocalico Creek is partially degraded due to agricultural runoff. Poor agricultural practices cause degradation in the

form of nutrient enrichment, turbidity and suspended solids. Recent degradation also occurred due to inadequately treated sewage from the Ephrata STP. However, this STP has been upgraded and improvement in water quality is expected.

Middle Creek has good water quality but localized areas show partial degradation. Free access of cattle to parts of Middle Creek cause degradation due to increased turbidity and suspended solids. Excess nutrients from the waterfowl areas at Middle Creek Lake also cause enrichment problems.

Little Muddy Creek is degraded throughout its lower five miles due to nutrient enrichment from agricultural runoff and the Adamstown STP, and from turbidity and suspended solids from the Adamstown STP. This stream is recommended for reclassification from trout stocking fisheries to warm water fisheries.

Pequea Creek (Figure 35) has good water quality, but agricultural runoff impacts its entire length (McMorran, 1986b; PaDER, 1986). Five miles of stream are degraded by nutrient enrichment and excessive turbidity and suspended solids. In addition, one tributary, South Fork Beaver Creek, is degraded by the discharge from the Quarryville STP that contains high levels of ammonia and chlorine. In addition, due to agriculture and urban runoff, it had been recommended that the classification for Big Beaver Creek be changed from trout stocked fisheries to warm water fisheries.

Conowingo Creek and Octoraro Creek (Figure 35) drain the most southeastern part of the Basin. Monthly monitoring results indicate that both of these streams are impacted by non point

source pollution (McMorran, 1987). High bacteria levels and nutrient loads indicate agricultural runoff pollution. Heavy metals and pesticides have been detected in Octoraro Creek in low concentrations. East Branch Octoraro Creek is also degraded by inadequately treated sewage from the Christiana STP (PaDER, 1986). Despite these problems, both streams support healthy communities of aquatic life. The high concentrations of nutrients result in highly productive conditions and high macroinvertebrate populations. Water quality in these two streams ranges from fair to good.

Muddy Creek and Broad Creek (Figure 35) both enter the Susquehanna River from the west bank. These streams drain similar watersheds where agriculture is the primary land use. Agricultural runoff does not cause a major problem in these streams; fish and macroinvertebrate populations are healthy indicating good water quality (McMorran, 1986b).

Deer Creek (Figure 35) has generally good water quality but elevated bacteria and nutrient concentrations and suspended sediment loads are indicative of agricultural runoff (McMorran 1986b; 1987). The lower two miles of Deer Creek is designated as a "critical habitat" as it contains the only known habitat of the rare and endangered Maryland darter (Etheostoma sellare).

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INDEX OF WATER BODIES

(Figures marked with an asterisk)

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A P P E N D I X

LEGEND - TABLES 2 THROUGH 7

NAME - Stream name.

DESCRIPTION - Reach of interest.

STATE - State where stream reach is located.

CLASS - State classification for reach of interest.

ATTAINED - Number of stream miles in reach which attain designated uses.

PART - Number of stream miles in reach which partially attain designated uses.

NOT - Number of stream miles in reach which do not attain designated uses.

TOTAL - Total number of stream miles in reach.

SURVEY - Year of last survey, nd = no date (date of last survey not available).

CAUSE - Cause of partial or non attainment of designated uses.

TABLE 1 - STREAM MILE ASSESSMENTS FOR THE SUSQUEHANNA RIVER BASIN

	LOWER SUSQ. SUBBASIN	UPPER SUSQ. SUBBASIN	EASTERN SUBBASIN	JUNIATA SUBBASIN	WEST BRANCH SUBBASIN	CHEMUNG SUBBASIN	BASIN TOTAL
Total Miles Assessed	1837	1171	875	1111	2085	463	7542
Miles Supporting Designated Uses	1498	971	797	1026	1478	374	6149
Miles Partially Supporting Designated Uses	190	76	73	27	186	45	592
Miles Not Supporting Designated Uses	149	124	5	58	421	44	801
Miles Attaining Clean Water Act Fishable Waters Goal	1689	1019	867	1041	1240	413	6269
Miles Not Attaining Clean Water Act Fishable Waters Goal	149	152	7	70	845	50	1273
Miles Attaining Clean Water Act Swimmable Waters Goal	1756	1125	813	1055	2015	427	7191
Miles Not Attaining Clean Water Act Swimmable Waters Goal	81	46	62	56	70	36	351

TABLE 2 - STREAM CLASSIFICATIONS - LOWER SUSQUEHANNA SUBBASIN (Subbasin 1)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Susquehanna River	West Branch to state line	Pa.	WWF	13.0	13.0		26.0	1987	D.O.
Susquehanna River	State line to Chesapeake Bay	Md.	I	11.5	6.5		18.0	1987	D.O.
Shamokin Creek	Source to mouth	Pa.	WWF	34.7	34.7			1985	Acid mine drainage
Little Shamokin Creek	Source to mouth	Pa.	CWF	12.7			12.7	1976	
Rolling Green Run	Mile 1.0 to mouth	Pa.	WWF	1.0			1.0	1984	
Penns Creek	Source to Pine Creek	Pa.	CWF	12.4			12.4	1985	
Penns Creek	Pine Creek to Laurel Run	Pa.	HQ-CWF	22.0			22.0	1985	
Penns Creek	Laurel Run to mouth	Pa.	WWF	31.3			31.3	1985	
Sinking Creek	Source to mouth	Pa.	CWF	19.6			19.6	1985	
Elk Creek	Source to mouth	Pa.	CWF	18.9			18.9	1985	
Pine Creek	Source to mouth	Pa.	CWF	20.4			20.4	1985	
Laurel Run	Source to mouth	Pa.	CWF	6.3			6.3	1985	
Middle Creek	Source to mouth	Pa.	TSF	35.9			35.9	1985	
North Branch Middle Creek	Source to mouth	Pa.	TSF	9.0			9.0	1985	
Mahanoy Creek	Source to mouth	Pa.	WWF			52.2	52.2	1985	Acid mine drainage
Little Mahanoy Creek	Source to mouth	Pa.	CWF	4.5		2.0	6.5	1978	Acid mine drainage
Schwaben Run	Source to mouth	Pa.	WWF	11.4			11.4	1985	
West Mahantango Creek	Origin to mouth	Pa.	WWF	2.1			2.1	1985	
North Branch West Mahantango Creek	Source to mouth	Pa.	TSF	13.3			13.3	1985	
West Branch West Mahantango Creek	Source to mouth	Pa.	TSF	18.0			18.0	1985	
East Mahantango Creek	Source to Pine Creek	Pa.	CWF	18.0			18.0	1985	
East Mahantango Creek	Pine Creek to mouth	Pa.	WWF	17.1			17.1	1985	
Pine Creek	Source to mouth	Pa.	CWF	14.5	8.3		22.8	1985	Acid mine drainage
Deep Creek	Source to mouth	Pa.	CWF	17.7	4.5		22.2	1985	Acid mine drainage

TABLE 2 (continued) - STREAM CLASSIFICATIONS - LOWER SUSQUEHANNA SUBBASIN (Subbasin 1)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Wiconisco Creek	Source to mouth	Pa.	WWF	41.2		27.0	68.2	1985	Acid mine drainage
Armstrong Creek	Source to mouth	Pa.	TSF	14.8			14.8	1985	
Powells Creek	Forks to mouth	Pa.	TSF	21.6			21.6	1985	
Little Juniata Creek	Source to mouth	Pa.	CWF	15.9			15.9	no date	
Sherman Creek	Source to Cisna Run Village	Pa.	CWF	17.4			17.4	1985	
Sherman Creek	Cisna Run Village to mouth	Pa.	WWF	38.0			38.0	1985	
Laurel Run	Source to mouth	Pa.	CWF	17.7			17.7	1985	
Clarks Creek	Source to mouth	Pa.	HQ-CWF	29.8			29.8	1985	
Stony Creek	Source to Ellendale Dam	Pa.	TSF	13.9			13.9	no date	
Stony Creek	Ellendale Dam to mouth	Pa.	WWF	8.0			8.0	1985	
Conodoquinet Creek	Source to Letterkenny Reservoir	Pa.	HQ-CWF	16.3			16.3	1976	
Conodoquinet Creek	Letterkenny Reservoir to Roxbury	Pa.	CWF	3.0			3.0	1985	
Conodoquinet Creek	Roxbury Village to mouth	Pa.	WWF	53.7	9.0		62.7	1987	Nutrient enrichment
Middle Spring Creek	Source to mouth	Pa.	CWF	7.0			7.0	1985	
Letort Spring Run	Source to mouth	Pa.	CWF	7.4			7.4	1976	
Trindle Spring Run	Source to mouth	Pa.	CWF	5.4			5.4	1976	
Paxton Creek	Source to mouth	Pa.	WWF	7.9	2.0	2.9	12.8	1985	Sewage, diss solids
Yellows Breeches Creek	Source to Mountain Creek	Pa.	HQ-CWF	23.7			23.7	1985	
Yellows Breeches Creek	Mountain Creek to mouth	Pa.	CWF	34.7			34.7	1985	
Mountain Creek	Source to mouth	Pa.	TSF	20.7			20.7	1985	
Swatara Creek	Source to Swatara Gap	Pa.	CWF			13.2	13.2	1985	Acid mine drainage
Swatara Creek	Swatara Gap to mouth	Pa.	WWF	58.5			58.5	1985	
Upper Little Swatara Creek	Source to mouth	Pa.	WWF	10.9			10.9	1985	

TABLE 2 (continued) - STREAM CLASSIFICATIONS - LOWER SUSQUEHANNA SUBBASIN (Subbasin 1)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Lower Little Swatara Creek	Source to mouth	Pa.	WWF	12.0			12.0	1985	
Little Swatara Creek	Source to mouth	Pa.	WWF	25.5			25.5	1985	
Quittapahilla Creek	Source to mouth	Pa.	TSF	1.0	10.6	4.9	16.5	1985	Ag runoff, heavy metals
Manada Creek	Source to mouth	Pa.	WWF	15.2			15.2	1985	
Spring Creek	Rt 422 to mouth	Pa.	WWF	2.5	0.3		2.8	1985	D.O./B.O.D
Beaver Creek	Source to mouth	Pa.	WWF	9.8			9.8	1985	D.O./B.O.D
East Conewago Creek	Source to mouth	Pa.	TSF	22.0		0.9	22.9	1985	Nutrient enrichment
West Conewago Creek	Source to Pleasant Dale Creek	Pa.	HQ-CWF	9.1			9.1	1976	
West Conewago Creek	Pleasant Dale Creek to Opossum Creek	Pa.	CWF	2.4			2.4	1985	
West Conewago Creek	Opossum Creek to Adams/York county line	Pa.	TSF	23.7			23.7	1985	
West Conewago Creek	Adams/York county line to mouth	Pa.	WWF	42.8			42.8	1985	
Bowers Run	Mile 0.9 to mouth	Pa.	WWF	0.4		0.5	0.9	1980	Sewage
Opossum Creek	Source to mouth	Pa.	TSF	11.5			11.5	1985	
South Branch Conewago Creek	State line to mouth	Pa.	WWF	23.4			23.4	1985	
South Branch Conewago Creek	Source to State line	Md.	I	2.0			2.0	1985	
Beaver Creek	Source to mouth	Pa.	WWF	5.5	0.5	1.0	7.0	1985	Sewage
Bermudian Creek	Source to mouth	Pa.	WWF	24.0			24.0	1985	
Latimore Creek	Source to mouth	Pa.	CWF	6.1			6.1	1985	
North Branch Bermudian Creek	Source to mouth	Pa.	WWF	11.8			11.8	1985	
Little Conewago Creek	Source to mouth	Pa.	TSF	23.9			23.9	1985	

TABLE 2 (continued) - STREAM CLASSIFICATIONS - LOWER SUSQUEHANNA SUBBASIN (Subbasin 1)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Codorus Creek	Source to West Branch Codorus Creek	Pa.	WWF	7.5			7.5	1985	
Codorus Creek	West Branch Codorus Creek to Oil Creek	Pa.	CWF	4.9			4.9	1976	
Codorus Creek	Oil Creek to mouth	Pa.	WWF		21.0	4.0	25.0	1985	diss solids, B.O.D.
South Branch Codorus Creek	Glen Rock to mouth	Pa.	WWF	4.5	10.0		14.5	1985	Ag runoff
East Branch Codorus Creek	Source to mouth	Pa.	CWF	13.8			13.8	1985	
West Branch Codorus Creek	Source to mouth	Pa.	WWF	14.1			14.1	1985	
Chickies Creek	Leb/Lan county line to mouth	Pa.	WWF	2.9	27.0		29.9	1985	Ag runoff
Shawnee Run	Source to mouth	Pa.	WWF	6.6		0.9	7.5	1984	Heavy metals
Kreutz Creek	Source to mouth	Pa.	HQ-CWF	17.6			17.6	1985	
Conestoga Creek	Source to mouth	Pa.	WWF	35.0	25.0		60.0	1985	Ag runoff
Manns Run	Mile 1.0 to mouth	Pa.	WWF			1.0	1.0	1973	Ag runoff
Muddy Creek	Little Muddy Creek to mouth	Pa.	WWF	15.4			15.4	1985	
Little Muddy Creek	Source to mouth	Pa.	TSF	5.0	5.0		10.0	1984	Sewage
Cocalico Creek	Blue Lake to mouth	Pa.	WWF	21.3	5.3		26.6	1985	Ag runoff
Middle Creek	Source to mouth	Pa.	HQ-TSF	13.4	2.0		15.4	1985	Nutrient enrichment
Hammer Creek	Source to Speedwell Forge Dam	Pa.	HQ-CWF	10.6			10.6	1976	
Hammer Creek	Speedwell Forge Dam to mouth	Pa.	TSF	19.4			19.4	1985	
Mill Creek	Source to mouth	Pa.	WWF	6.5	18.5	2.7	27.7	1985	Sewage, Ag runoff
Little Conestoga Creek	Source to mouth	Pa.	WWF	19.8			19.8	1985	
Pequea Creek	Source to mouth	Pa.	WWF	47.3	5.0		52.3	1985	
Beaver Creek	Quarryville STP to mouth	Pa.	TSF		0.6	0.5	1.1	1983	Sewage
Muddy Creek	Forks to mouth	Pa.	TSF	16.7			16.7	1985	

TABLE 2 (continued) - STREAM CLASSIFICATIONS - LOWER SUSQUEHANNA SUBBASIN (Subbasin 1)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
North Branch Muddy Creek	Source to mouth	Pa.	CWF	11.8			11.8	1985	
South Branch Muddy Creek	Source to mouth	Pa.	HQ-CWF	10.1			10.1	1985	
Conowingo Creek	Source to state line	Pa.	CWF	15.6			15.6	1987	
Conowingo Creek	State line to mouth	Md.	I	4.0			4.0	1987	
Octoraro Creek	Octoraro Lake to state line	Pa.	WWF	5.2			5.2	1987	
Octoraro Creek	State line to mouth	Md.	IV	8.6			8.6	1987	
East Branch Octoraro Creek	Christiana to Octoraro Lake	Pa.	TSF	15.9	1.0		16.9	1985	Sewage, Ag runoff
West Branch Octoraro Creek	Source to Octoraro Lake	Pa.	HQ-CWF	19.7			19.7	1985	
Broad Creek	Source to mouth	Md.	I	16.0			16.0	1985	
Deer Creek	Source to state line	Pa.	CWF	7.2			7.2	1987	
Deer Creek	State line to mouth	Md.	III	44.5			44.5	1987	

SUMMARY

TOTAL MILES ASSESSED..........................1837.1

MILES ATTAINED................................1497.7

MILES PARTIALLY ATTAINED......................190.0

MILES NOT ATTAINED............................149.4

MILES NOT SWIMMABLE...........................81.0

MILES NOT FISHABLE............................148.5

LAST UPDATE.....................December 29, 1987

TABLE 3 - STREAM CLASSIFICATIONS - UPPER SUSQUEHANNA SUBBASIN (Subbasin 2)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Susquehanna River	Chemung River to Lackawanna River	Pa.	WWF	92.5	0.5		93.0	1984	NH3
Susquehanna River	Lackawanna River to West Branch Susquehanna River	Pa.	WWF	46.0	26.0	2.0	74.0	1985	Acid mine drainage and diss. solids
Sugar Creek	Source to Tomjack Creek	Pa.	TSF	20.6			20.6	1982	
Sugar Creek	Tomjack Creek to mouth	Pa.	WWF	11.6			11.6	1982	
North Branch Sugar Creek	Source to mouth	Pa.	TSF	9.7			9.7	nd	
Tomjack Creek	Source to mouth	Pa.	TSF	11.1			11.1	nd	
Towanda Creek	Source to Canton	Pa.	CWF	5.4			5.4	1982	
Towanda Creek	Canton Boro to South Branch	Pa.	TSF	25.6			25.6	1982	
Towanda Creek	South Branch to mouth	Pa.	WWF	4.1			4.1	1982	
North Branch Towanda Creek	Source to mouth	Pa.	CWF	14.5			14.5	nd	
Schrader Creek	Source to mouth	Pa.	HQ-CWF	11.4	4.0	8.5	23.9	1983	Acid mine drainage
South Branch Towanda Creek	Source to mouth	Pa.	CWF	16.4			16.4	1982	
Wysox Creek	Source to mouth	Pa.	CWF	14.5			14.5	1982	
Johnson Creek	Source to mouth	Pa.	CWF	11.5			11.5	nd	
Wyalusing Creek	Source to mouth	Pa.	WWF	15.2	4.0		19.2	1982	Domestic sewage
South Branch Wyalusing Creek	Source to mouth	Pa.	WWF		9.0		9.0	1984	Ag runoff, natural low flow
Pettis Creek	Source to mouth	Pa.	WWF	3.1	0.5		3.6	1982	DO/BOD
East Branch Wyalusing Creek	Source to mouth	Pa.	CWF	15.2			15.2	nd	
North Branch Wyalusing Creek	Source to mouth	Pa.	CWF	13.9			13.9	nd	
Middle Branch Wyalusing Creek	Source to mouth	Pa.	CWF	11.8			11.8	nd	

TABLE 3 (continued) - STREAM CLASSIFICATIONS - UPPER SUSQUEHANNA SUBBASIN (Subbasin 2)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Sugar Run	Source to mouth	Pa.	CWF	9.0	0.5		9.5	1985	Landfill leachate
Tuscarora Creek	Source to mouth	Pa.	CWF	10.8			10.8	nd	
Meshoppen Creek	Source to mouth	Pa.	CWF	29.7			29.7	1982	
West Branch Meshoppen Creek/White Creek	Source to mouth	Pa.	CWF	14.1			14.1	nd	
Mehoopany Creek	Source to North Fork	Pa.	HQ-CWF	19.6			19.6	1982	
Mehoopany Creek	North Fork to mouth	Pa.	CWF	6.5			6.5	1982	
North Fork Mehoopany Creek	Source to mouth	Pa.	CWF	15.8			15.8	1982	
Tunkhannock Creek	Source to South Branch	Pa.	WWF	35.9			35.9	1982	
Tunkhannock Creek	South Branch to mouth	Pa.	TSF	6.3			6.3	1982	
Leslie Creek/Nine Partners Creek	Source to mouth	Pa.	CWF	10.5			10.5	nd	
East Branch Tunkhannock Creek	Source to mouth	Pa.	CWF	20.4			20.4	nd	
Martin Creek	Source to mouth	Pa.	CWF	20.6			20.6	nd	
South Branch Tunkhannock Creek	Source to mouth	Pa.	CWF	23.3			23.3	nd	
Ackerly Creek	South Branch to mouth	Pa.	TSF	4.0	4.7		8.7	1983	Sewage
Bowman Creek	Source to mouth	Pa.	HQ-CWF	29.5			29.5	1982	
Buttermilk Creek	Source to mouth	Pa.	CWF	6.3			6.3	nd	
Lackawanna River	Source to Rush Brook	Pa.	TSF	29.2			29.2	1982	
Lackawanna River	Rush Brook to mouth	Pa.	WWF		21.6	3.0	24.6	1982	Acid mine drainage and sewage
Leggetts Creek	Griffin Reservoir to mouth	Pa.	CWF	5.8			5.8	1982	
Roaring Brook	Source to mouth	Pa.	CWF	20.9			20.9	1982	
Spring Brook	Source to Pa. Turnpike	Pa.	HQ-CWF	15.2			15.2	nd	
Spring Brook	Pa. Turnpike to mouth	Pa.	CWF	2.4			2.4	nd	

TABLE 3 (continued) - STREAM CLASSIFICATIONS - UPPER SUSQUEHANNA SUBBASIN (Subbasin 2)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Mill Creek	Source to mouth	Pa.	CWF	13.7	0.5		14.2	1982	Urban trash
Toby Creek	Source to mouth	Pa.	CWF	9.1	1.4	1.0	11.5	1982	Dissolved solids
Solomon Creek	Source to mouth	Pa.	CWF	4.2	3.3	1.5	9.0	1982	Acid mine drainage and diss. solids
Nanticoke Creek	Source to mouth	Pa.	CWF	1.4		3.6	5.0	1982	Acid mine drainage
Newport Creek	Source to mouth	Pa.	CWF			4.8	4.8	1982	Acid mine drainage
Harveys Creek	Pikes Creek to mouth	Pa.	CWF	20.2			20.2	1982	
Hunlock Creek	Source to mouth	Pa.	CWF	7.7			7.7	1982	
Shickshinny Creek	Source to mouth	Pa.	CWF	10.3			10.3	1982	
Little Wapwallopen Creek	Source to mouth	Pa.	CWF	11.7			11.7	1982	
Wapwallopen Creek	Source to mouth	Pa.	CWF	25.3			25.3	1982	
Nescopeck Creek	Source to PA 309 bridge	Pa.	HQ-CWF	14.7			14.7	1982	
Nescopeck Creek	PA 309 bridge to mouth	Pa.	TSF	12.2		13.5	25.7	1982	Acid mine drainage
Little Nescopeck Creek	Source to mouth	Pa.	CWF			9.1	9.1	1982	Acid mine drainage
Black Creek	Source to mouth	Pa.	CWF			23.5	23.5	1982	Acid mine drainage
Briar Creek	Source to mouth	Pa.	CWF	7.1			7.1	1982	
Fishing Creek	Origin to Huntingdon Creek	Pa.	CWF	16.9			16.9	1982	
Fishing Creek	Huntingdon Creek to Green Creek	Pa.	TSF	4.2			4.2	1982	
Fishing Creek	Green Creek to mouth	Pa.	WWF	9.5			9.5	1982	
Huntingdon Creek	Source to Kitchen Creek	Pa.	HQ-CWF	12.0			12.0	1982	
Huntingdon Creek	Kitchen Creek to mouth	Pa.	TSF	16.7			16.7	1982	
Green Creek	Source to mouth	Pa.	TSF	12.5			12.5	nd	
Little Fishing Creek	Source to mouth	Pa.	CWF	23.2			23.2	1982	
Catawissa Creek	Source to Rattling Run	Pa.	CWF			15.2	15.2	1982	Acid mine drainage

TABLE 3 (continued) - STREAM CLASSIFICATIONS - UPPER SUSQUEHANNA SUBBASIN (Subbasin 2)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Catawissa Creek	Rattling Run to mouth	Pa.	TSF			27.2	27.2	1982	Acid mine drainage
Tomhickon Creek	Source to mouth	Pa.	CWF			10.6	10.6	nd	Acid mine drainage
Roaring Creek	Source to mouth	Pa.	TSF	20.2			20.2	1982	
South Branch Roaring Creek	Source to mouth	Pa.	CWF	17.7			17.7	1982	
Mahoning Creek	Source to Rt 54 bridge	Pa.	TSF	7.9			7.9	1982	
Mahoning Creek	RT 54 bridge to mouth	Pa.	WWF	3.0			3.0	1982	

SUMMARY

TOTAL MILES ASSESSED..........................1170.8

MILES ATTAINED................................971.3

MILES PARTIALLY ATTAINED.......................76.0

MILES NOT ATTAINED............................123.5

MILES NOT SWIMMABLE............................45.5

MILES NOT FISHABLE............................151.7

LAST UPDATE:........................January 4, 1988

TABLE 4 - STREAM CLASSIFICATIONS - EASTERN SUBBASIN (Subbasin 3)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Susquehanna River	Otsego Lake to state line	N.Y.	B	79.0	8.0		87.0	1984	Sewage
Susquehanna River	State line to state line	Pa.	WWF	14.7			14.7	1984	
Susquehanna River	State line to Conklin	N.Y.	B	4.0			4.0	1984	
Susquehanna River	Conklin to Rock Bottom Dam	N.Y.	A	9.0			9.0	1984	
Susquehanna River	Rock Bottom Dam to Tioga-Broome county line	N.Y.	C	11.0	3.0		14.0	1984	Sewage
Susquehanna River	Tioga-Broome county line to east border of Owego	N.Y.	B	9.0			9.0	1984	
Susquehanna River	East border to Owego to 3.0 miles downstream of west border of Owego	N.Y.	C	4.0			4.0	1984	
Susquehanna River	3.0 miles downnstream of west border of Owego to state line	N.Y.	B	12.0			12.0	1984	
Susquehanna River	State line to Chemung River	Pa.	WWF	7.0			7.0	1984	
Oaks Creek	Source to mouth	N.Y.	D	13.3			13.3	1984	
Cherry Valley Creek	Source to mouth	N.Y.	C	29.9			29.9	1984	
Schenevus Creek	Source to mouth	N.Y.	C	28.6			28.6	1984	
Elk Creek	Source to mouth	N.Y.	C	13.8			13.8	1984	
Charlotte Creek	Source to mouth	N.Y.	C	28.4			28.4	1984	
Kortright Creek	Source to mouth	N.Y.	C	10.9			10.9	1984	
Otego Creek	Source to mouth	N.Y.	C	28.6			28.6	1984	
Ouleout Creek	Source to mouth	N.Y.	C	26.2			26.2	1984	
Unadilla River	Source to mouth	N.Y.	B	36.7	28.6		65.3	1984	Bacteria
Butternut Creek	Source to mouth	N.Y.	C	37.3			37.3	1984	
Wharton Creek	Source to mouth	N.Y.	C	29.5			29.5	1984	
Kelsey Creek	Source to mouth	N.Y.	D	9.6			9.6	1984	
Starrucca Creek	Source to mouth	Pa.	CWF	18.2			18.2	1984	

TABLE 4 (continued) - STREAM CLASSIFICATIONS - EASTERN SUBBASIN (Subbasin 3)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Snake Creek	Source to state line	Pa.	CWF	22.5			22.5	1984	
Snake Creek	State line to mouth	N.Y.	D	1.8			1.8	1984	
Salt Lick Creek	Source to mouth	Pa.	HQ-CWF	14.9			14.9	1984	
Chenango River	Payne Brook to Fly Creek	N.Y.	B	17.4			17.4	1984	
Chenango River	Fly Creek to Norwich-North Norwich line	N.Y.	B		4.6		4.6	1984	Bacteria
Chenango River	Norwich-N. Norwich line to trib 47	N.Y.	D	19.5			19.5	1984	
Chenango River	Trib 47 to trib 41	N.Y.	C	2.8			2.8	1984	
Chenango River	Trib 41 to mouth	N.Y.	B	15.0	15.0		30.0	1984	Bacteria
Sangerfield River	Source to mouth	N.Y.	D	11.8			11.8	1984	
Payne Brook	Lake Moraine to Hamilton	N.Y.	C	3.3			3.3	nd	
Payne Brook	Hamilton to mouth	N.Y.	D			2.3	2.3	1984	Sewage
Canasawacta Creek	Source to mouth	N.Y.	B	6.4			6.4	1984	
Geneganslet Creek	Source to mouth	N.Y.	C	10.9			10.9	1984	
West Branch Tioughnioga River	Source to mouth	N.Y.	C	7.5			7.5	1984	
East Branch Tioughnioga River	Source to trib 6	N.Y.	C	14.3			14.3	1984	
East Branch Tioughnioga River	Trib 6 to mouth	N.Y.	C	3.7			3.7	1984	
Tioughnioga River	Source to trib 52	N.Y.	B	9.8			9.8	1984	
Tioughnioga River	Trib 52 to trib 45	N.Y.	B	4.2			4.2	1984	
Tioughnioga River	Trib 45 to mouth	N.Y.	B	19.6			19.6	1984	
Trout Brook	0.5 mile upstream trib 8 to mouth	N.Y.	D	3.3			3.3	1984	
Otselic River	Trib 63 to mouth	N.Y.	C	32.3			32.3	1984	
Mud Creek	Source to mouth	N.Y.	C	5.3			5.3	1984	

TABLE 4 (continued) - STREAM CLASSIFICATIONS - EASTERN SUBBASIN (Subbasin 3)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Brakel Creek	Source to mouth	N.Y.	D	7.3		3.0	10.3	1984	Sewage
Choconut Creek	Source to state line	Pa.	WWF	6.9			6.9	1984	
Choconut Creek	State line to mouth	N.Y.	D	9.1			9.1	1984	
Little Choconut Creek	Source to mouth	N.Y.	D	9.0		0.1	9.1	1984	Thermal pollution
Apalachin Creek	Source to state line	Pa.	WWF	5.0			5.0	1984	
Apalachin Creek	State line to mouth	N.Y.	D	3.2			3.2	1984	
Nanticoke Creek	Trib 11 to mouth	N.Y.	C	8.1			8.1	1984	
Owego Creek	Source to mouth	N.Y.	C	13.3			13.3	1984	
Catatonk Creek	Source to mouth	N.Y.	C	13.9			13.9	1984	
Wappasening Creek	Source to state line	Pa.	WWF	17.6			17.6	1984	
Wappasening Creek	State line to mouth	N.Y.	C	2.1			2.1	1984	
Cayuta Creek	Trib 62 to trib 30	N.Y.	B	8.2			8.2	1984	
Cayuta Creek	Trib 30 to state line	N.Y.	B	17.4			17.4	1984	
Cayuta Creek	State line to mouth	Pa.	WWF	2.0			2.0	1984	

SUMMARY

TOTAL MILES ASSESSED............................874.7

MILES ATTAINED..................................796.6

MILES PARTIALLY ATTAINED........................72.7

MILES NOT ATTAINED..............................5.4

MILES NOT SWIMMABLE.............................61.5

MILES NOT FISHABLE..............................7.4

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TABLE 5 - STREAM CLASSIFICATIONS - JUNIATA SUBBASIN (Subbasin 4)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Frankstown Branch Juniata River	Beaverdam Creek to Halter Creek	Pa.	TSF	14.8			14.8	nd	
Frankstown Branch Juniata River	Halter Creek to Piney Creek	Pa.	WWF		12.0		12.0	1982	Industrial and Municipal discharges
Frankstown Branch Juniata River	Piney Creek to Rt 22 bridge	Pa.	TSF	14.8			14.8	1982	
Frankstown Branch Juniata River	Rt 22 bridge to mouth	Pa.	WWF	6.0			6.0	1985	
Halter Creek	Source to mouth	Pa.	WWF			9.4	9.4	1976	STP discharges
Plum Creek	Source to mouth	Pa.	WWF	3.1	2.0	1.5	6.6	1984	STP discharges
Beaverdam Branch	Source to mouth	Pa.	WWF			14.0	14.0	1984	STP discharges
Burgoon Run	Lake Altoona to mouth	Pa.	WWF			3.0	3.0	1984	Acid mine drainage
Sugar Run	Source to mouth	Pa.	WWF			6.3	6.3	1984	Acid mine drainage
Blairs Gap Run	Source to mouth	Pa.	WWF	9.1		0.4	9.5	1984	STP discharges
Clover Creek	Source to mouth	Pa.	HQ-CWF	23.7			23.7	1985	
Little Juniata River	Source to Spruce Creek	Pa.	TSF	16.6	6.0	2.0	24.6	1985	STP and Industrial discharges
Little Juniata River	Spruce Creek to mouth	Pa.	CWF	6.6			6.6	1985	
Sugar Run	Source to mouth	Pa.	WWF			2.5	2.5	1984	Landfill leachate
Bells Gap Run	Source to mouth	Pa.	TSF			8.5	8.5	1984	Acid mine drainage
South Bald Eagle Creek	Source to mouth	Pa.	TSF	13.3			13.3	1985	
Sinking Run	Source to mouth	Pa.	CWF	13.2			13.2	nd	
Spruce Creek	Source to mouth	Pa.	HQ-CWF	16.2			16.2	1985	
Beaver Branch	Source to mouth	Pa.	HQ-CWF	9.2			9.2	nd	
Warriors Mark Run	Source to mouth	Pa.	HQ-CWF	10.5			10.5	nd	
Raystown Branch Juniata River	Somerset County reach	Pa.	CWF	9.1			9.1	nd	

TABLE 5 (continued) - STREAM CLASSIFICATIONS - JUNIATA SUBBASIN (Subbasin 4)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Raystown Branch Juniata River	Bedford County reach	Pa.	TSF	81.9			81.9	1985	
Raystown Branch Juniata River	Bedford county to mouth	Pa.	WWF	35.0			35.0	1985	
Breastwork Run	Source to mouth	Pa.	HQ-CWF	7.0			7.0	1983	
Shawnee Branch	Source to mouth	Pa.	CWF	9.7			9.7	nd	
Buffalo Run	Source to mouth	Pa.	CWF	8.8			8.8	nd	
Dunning Creek	Source to mouth	Pa.	WWF	27.4			27.4	1985	
Bobs Creek	Source to mouth	Pa.	CWF	21.4			21.4	1985	
Adams Run	Source to mouth	Pa.	WWF	3.4	1.3		4.7	nd	
Cove Creek	Source to mouth	Pa.	CWF	20.1			20.1	nd	
Brush Creek county line	Source to Bedford	Pa.	HQ-CWF	11.4			11.4	nd	
Brush Creek	Bedford county line to mouth	Pa.	WWF	12.9			12.9	1985	
Shaffer Creek	Source to mouth	Pa.	WWF	12.9			12.9	nd	
Yellow Creek	Source to mouth	Pa.	HQ-CWF	16.2	4.0		20.2	1982	STP discharges
Great Trough Creek	Source to mouth	Pa.	TSF	26.0		3.0	29.0	1983	STP discharges
Little Trough Creek	Source to mouth	Pa.	TSF	13.3			13.3	nd	
Juniata River	Source to mouth	Pa.	WWF	91.5			91.5	1985	
Shaver Creek	Source to mouth	Pa.	HQ-CWF	19.0			19.0	1985	
Standing Stone Creek	Source to mouth	Pa.	HQ-CWF	35.5			35.5	1985	
Crooked Creek	Source to mouth	Pa.	WWF	11.0			11.0	nd	
Mill Creek	Source to mouth	Pa.	TSF	8.5			8.5	nd	
Aughwick Creek	Source to mouth	Pa.	TSF	30.2			30.2	1985	
Sideling Hill Creek	Source to mouth	Pa.	HQ-CWF	26.2			26.2	1985	
Wooden Bridge Creek	Source to mouth	Pa.	HQ-CWF	15.5			15.5	nd	

TABLE 5 (continued) - STREAM CLASSIFICATIONS - JUNIATA SUBBASIN (Subbasin 4)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Little Aughwick Creek	Source to mouth	Pa.	TSF	18.9			18.9	1985	
Three Springs Creek	Source to mouth	Pa.	CWF	11.3			11.3	1985	
North Spring Branch	Source to mouth	Pa.	CWF	7.2			7.2	1983	
Spring Creek	Source to mouth	Pa.	CWF	4.2			4.2	1983	
Blacklog Creek	Shade Creek to mouth	Pa.	CWF	4.5			4.5	1985	
Blacklog Creek	Source to Shade Creek	Pa.	HQ-CWF	24.5			24.5	1985	
Shade Creek	Source to mouth	Pa.	TSF	9.9			9.9	1985	
Kishacoquillas Creek	Source to Tea Creek	Pa.	CWF	12.6		5.0	17.6	1981	Ag runoff
Kishacoquillas Creek	Tea Creek to mouth	Pa.	TSF	4.1		2.7	6.8	1985	STP and industrial discharges
Honey Creek	Source to Laurel Creek	Pa.	HQ-CWF	16.2			16.2	nd	
Honey Creek	Laurel Creek to mouth	Pa.	CWF	4.9			4.9	1985	
Treaster Run	Source to mouth	Pa.	HQ-CWF	13.7			13.7	nd	
Laurel Creek	Source to mouth	Pa.	HQ-CWF	13.0			13.0	nd	
Jacks Creek	Source to Meadows Creek	Pa.	CWF	11.4			11.4	nd	
Jacks Creek	Meadows Creek to mouth	Pa.	TSF	6.3	2.0		8.3	1984	Ag runoff
Lost Creek	Source to Little Lost Creek	Pa.	CWF	9.3			9.3	nd	
Lost Creek	Little Lost Creek to mouth	Pa.	TSF	7.8			7.8	nd	
Tuscarora Creek	Source to mouth	Pa.	CWF	49.0			49.0	1985	
East Licking Creek	Source to Clearview Reservoir	Pa.	HQ-CWF	14.5			14.5	nd	
East Licking Creek	Clearview Reservoir to mouth	Pa.	CWF	9.1			9.1	1985	
Narrows Branch Tuscarora Creek	Source to mouth	Pa.	CWF	9.8			9.8	1985	
Willow Run	Source to mouth	Pa.	CWF				0.0	1976	
Cocolamus Creek	Source to mouth	Pa.	TSF	21.7			21.7	1985	

TABLE 5 (continued) - STREAM CLASSIFICATIONS - JUNIATA SUBBASIN (Subbasin 4)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Buffalo Creek	Source to mouth	Pa.	HQ-CWF	30.8			30.8	1985	

SUMMARY

TOTAL MILES ASSESSED..........................1111.3

MILES ATTAINED................................1025.7

MILES PARTIALLY ATTAINED.......................27.3

MILES NOT ATTAINED.............................58.3

MILES NOT SWIMMABLE............................56.3

MILES NOT FISHABLE.............................70.3

LAST UPDATE:.........................January 4, 1988

TABLE 6 - STREAM CLASSIFICATIONS - WEST BRANCH SUBBASIN (Subbasin 5)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
West Branch Susquehanna River	Source to Mahaffey	Pa.	WWF		38.0	12.0	50.0	1983	Acid mine drainage
West Branch Susquehanna River	Mahaffey to Clearfield	Pa.	WWF	10.0	17.0	10.0	37.0	1983	Acid mine drainage
West Branch Susquehanna River	Clearfield to Jersey Shore	Pa.	WWF		15.0	100.0	115.0	1983	Acid mine drainage
West Branch Susquehanna River	Jersey Shore to Susquehanna River	Pa.	WWF	55.0			55.0	1983	
Cush Cushion Creek	Source to mouth	Pa.	HQ-CWF	7.0			7.0	1983	
Cush Creek	Source to mouth	Pa.	CWF		5.0		5.0	1983	Heavy metals
Bear Run	Source to mouth	Pa.	CWF	5.0		3.0	8.0	1983	Acid mine drainage
Chest Creek	Patton to mouth	Pa.	CWF	30.8	7.0		37.8	1983	Nutrient enrichment Acid mine drainage
Brubaker Run	Source to mouth	Pa.	CWF			5.7	5.7	1983	Acid mine drainage
McCracken Run	Source to mouth	Pa.	CWF	3.0			3.0	1983	
Anderson Creek	Source to mouth	Pa.	CWF	12.8		10.0	22.8	1983	Acid mine drainage
Montgomery Run	Source to mouth	Pa.	HQ-CWF	4.9			4.9	nd	
Little Anderson Creek	Source to mouth	Pa.	CWF			6.5	6.5	nd	Acid mine drainage
Kratzer Run	Source to mouth	Pa.	CWF			6.2	6.2	nd	Acid mine drainage
Montgomery Creek	Source to Montgomery Dam	Pa.	HQ-CWF	2.1			2.1	nd	
Montgomery Creek	Montgomery Dam to mouth	Pa.	CWF	0.8		2.8	3.6	nd	Acid mine drainage
Clearfield Creek	Source to mouth	Pa.	WWF		20.9	50.0	70.9	1983	Acid mine drainage
Powell Run	Source to mouth	Pa.	CWF	3.6			3.6	1984	
Beaverdam Run	Glendale Lake to mouth	Pa.	CWF	2.0			2.0	1983	
North Whitmer Run	Source to mouth	Pa.	CWF	6.1			6.1	1983	
Muddy Run	Source to mouth	Pa.	CWF	12.0			12.0	nd	
Muddy Run	Source to mouth	Pa.	HQ-CWF	4.6			4.6	1983	

TABLE 6 (continued) - STREAM CLASSIFICATIONS - WEST BRANCH SUBBASIN (Subbasin 5)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Little Clearfield Creek	Source to mouth	Pa.	CWF	20.1			20.1	1983	
Lick Run	Source to mouth	Pa.	HQ-CWF	3.2	4.5	3.7	11.4	1983	AMD, acid precip
Trout Run	Source to mouth	Pa.	HQ-CWF	8.8	5.0		13.8	1983	Acid mine drainage
Surveyor Run	Source to mouth	Pa.	CWF			4.0	4.0	1983	Acid mine drainage
Deer Creek	Source to mouth	Pa.	CWF			10.0	10.0	1983	Acid mine drainage
Alder Run	Source to mouth	Pa.	CWF			5.0	5.0	1983	Acid mine drainage
Moshannon Creek	Source to mouth	Pa.	TSF	3.6		52.0	55.6	1983	Acid mine drainage
Laurel Run	Source to mouth	Pa.	CWF			4.0	4.0	1983	Acid mine drainage
Cold Stream	Source to Rt 322	Pa.	HQ-CWF	12.0			12.0	1983	
Cold Stream	Rt 322 to mouth	Pa.	CWF			1.0	1.0	1983	Acid mine drainage
Black Bear Run	Source to mouth	Pa.	HQ-CWF	6.8			6.8	nd	
Six Mile Run	Source to mouth	Pa.	HQ-CWF	10.0			10.0	1983	
Black Moshannon Creek	Source to mouth	Pa.	HQ-CWF	13.0	1.0		14.0	1983	Acid mine drainage
Mosquito Creek	Source to mouth	Pa.	HQ-CWF	18.1		3.0	21.1	1983	Acid mine drainage
Bennett Branch Sinnemahoning Creek	Source to mouth	Pa.	WWF		8.3	35.0	43.3	1983	Acid mine drainage
Kersey Run	Source to mouth	Pa.	CWF	12.1			12.1	nd	
Laurel Run	Source to mouth	Pa.	HQ-CWF	16.5			16.5	nd	
Medix Run	Source to mouth	Pa.	HQ-CWF	9.8			9.8	nd	
Trout Run	Source to mouth	Pa.	CWF	12.7			12.7	nd	
Dents Run	Source to mouth	Pa.	CWF	14.0			14.0	nd	
Hicks Run	Source to mouth	Pa.	HQ-CWF	11.1			11.1	nd	
Mix Run	Source to English Draft Run	Pa.	EV	3.7			3.7	nd	
Mix Run	English Draft Run to mouth	Pa.	HQ-CWF	8.6			8.6	nd	
Driftwood Branch Sinnemahoning Creek	Source to mouth	Pa.	TSF	36.0			36.0	1983	

TABLE 6 (continued) - STREAM CLASSIFICATIONS - WEST BRANCH SUBBASIN (Subbasin 5)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
West Creek	Source to mouth	Pa.	HQ-CWF	19.3			19.3	nd	
Sinnemahoning Portage	Source to mouth	Pa.	CWF	14.0			14.0	nd	
Hunts Run	Source to mouth	Pa.	HQ-CWF	7.5			7.5	nd	
Sterling Run	Source to mouth	Pa.	CWF	8.3			8.3	nd	
First Fork Sinnemahoning Creek	Source to mouth	Pa.	HQ-CWF	39.0			39.0	1983	
Freeman Run	Source to mouth	Pa.	HQ-CWF	12.1			12.1	nd	
East Fork Sinnemahoning Creek	Source to Dolliver Trail	Pa.	EV	2.6			2.6	nd	
East Fork Sinnemahoning Creek	Dolliver Trail to mouth	Pa.	HQ-CWF	14.2			14.2	nd	
Sinnemahoning Creek	Source to mouth	Pa.	WWF			15.7	15.7	1983	Acid mine drainage
Wykoff Run	Source to mouth	Pa.	HQ-CWF	10.0			10.0	1983	
Cooks Run	Source to mouth	Pa.	HQ-CWF			11.6	11.6	1983	Acid mine drainage
Kettle Creek	Source to Bush Dam	Pa.	HQ-TSF	40.0			40.0	1983	
Kettle Creek	Bush Dam to mouth	Pa.	HQ-TSF	3.5		3.0	6.5	1983	Acid mine drainage
Cross Fork	Source to mouth	Pa.	HQ-TSF	10.0			10.0	nd	
Hammersley Fork	Source to mouth	Pa.	EV	8.6			8.6	nd	
John Summerson Branch	Source to mouth	Pa.	EV	2.5			2.5	1980	
Two Mile Run	Source to mouth	Pa.	HQ-TSF			4.5	4.5	1983	Acid mine drainage
Drury Run	Source to mouth	Pa.	HQ-CWF			3.0	3.0	1983	Acid mine drainage
Sandy Run	Source to mouth	Pa.	HQ-CWF	0.5	1.0		1.5	1981	Acid mine drainage
Stony Run	Source to mouth	Pa.	HQ-CWF	2.0		1.3	3.3	1981	Acid mine drainage
Woodley Draft	Source to mouth	Pa.	HQ-CWF			1.7	1.7	1981	Acid mine drainage
Paddy Run	Source to mouth	Pa.	HQ-CWF	20.0			20.0	1983	
Young Womans Creek	Source to mouth	Pa.	HQ-CWF	15.8			15.8	1983	

TABLE 6 (continued) - STREAM CLASSIFICATIONS - WEST BRANCH SUBBASIN (Subbasin 5)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Left Branch Young Womans Creek	Source to mouth	Pa.	HQ-CWF	11.2			11.2	nd	
Hyner Run	Source to mouth	Pa.	HQ-CWF	8.8			8.8	1983	
Baker Run	Source to mouth	Pa.	HQ-CWF	9.4			9.4	1983	
Tangascootack Creek	Source to mouth	Pa.	CWF	2.3	9.0		11.3	1983	Acid mine drainage
Lick Run	Source to mouth	Pa.	HQ-CWF	16.3			16.3	1983	
Bald Eagle Creek	Source to Nittany Creek	Pa.	WWF	26.1			26.1	1983	
Bald Eagle Creek	Nittany Creek to mouth	Pa.	WWF	30.0			30.0	1983	
Spring Creek	Source to mouth	Pa.	CWF	3.0	22.0		25.0	1983	Pesticide/herbicide contamination, nutrient enrichment
Slab Cabin Run	Source to mouth	Pa.	CWF	8.7		1.0	9.7	1985	Sewage
Buffalo Run	Source to mouth	Pa.	CWF	14.1			14.1	1983	
Marsh Creek	Source to mouth	Pa.	CWF	17.3			17.3	nd	
Beech Creek	Source to mouth	Pa.	CWF			35.1	35.1	1983	Acid mine drainage
Big Run	Source to mouth	Pa.	CWF	9.7		7.0	16.7	1983	Acid mine drainage
Fishing Creek	Source to mouth	Pa.	CWF	42.0			42.0	1983	
Little Fishing Creek	Source to mouth	Pa.	HQ-CWF	15.8			15.8	nd	
Long Run/Pepper Run	Source to mouth	Pa.	HQ-CWF	13.3			13.3	nd	
McElhattan Creek	Water Supply Intake to mouth	Pa.	CWF	15.0			15.0	1983	
Chatham Run	Source to mouth	Pa.	CWF	6.0	2.0		8.0	1983	Undetermined
Pine Creek	Source to South Branch	Pa.	HQ-CWF	13.4			13.4	nd	
Pine Creek	South Branch to Marsh Creek	Pa.	TSF	13.6			13.6	nd	
Pine Creek	Marsh Creek to mouth	Pa.	HQ-TSF	59.5			59.5	1983	
Genesee Fork/Lehman Hollow	Source to mouth	Pa.	HQ-CWF	12.1			12.1	nd	

TABLE 6 (continued) - STREAM CLASSIFICATIONS - WEST BRANCH SUBBASIN (Subbasin 5)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
West Branch Pine Creek	Source to mouth	Pa.	HQ-CWF	17.2			17.2	nd	
Johnson Brook	Source to mouth	Pa.	EV	3.5			3.5	1980	
Marsh Creek	Source to Straight Run	Pa.	WWF	14.9		2.5	17.4	1975	Municipal sewage
Marsh Creek/ Charleston Creek	Straight Run to mouth	Pa.	TSF	1.5		2.5	4.0	1975	Municipal sewage
Babb Creek	Source to mouth	Pa.	CWF	7.5		14.0	21.5	1983	Acid mine drainage
Wilson Creek	Source to mouth	Pa.	CWF	9.3		2.3	11.6	nd	Acid mine drainage
Stony Fork/East Branch Stony Fork	Source to mouth	Pa.	CWF	12.8			12.8	nd	
Cedar Run	Source to mouth	Pa.	HQ-CWF	11.2			11.2	nd	
Slate Run/Francis Branch	Source to mouth	Pa.	HQ-CWF	12.7			12.7	nd	
Little Pine Creek	Source to Little Pine Creek Dam	Pa.	CWF	11.6			11.6	1983	
Little Pine Creek	Little Pine Creek Dam to mouth	Pa.	TSF	4.0			4.0	1983	
Blockhouse Creek	Source to mouth	Pa.	CWF	17.6			17.6	nd	
Texas Creek	Source to mouth	Pa.	HQ-CWF	15.7			15.7	nd	
Otter Run	Source to mouth	Pa.	CWF			3.6	3.6	nd	Acid mine drainage
Antes Creek	Source to mouth	Pa.	CWF	14.0			14.0	1983	
Larrys Creek	Source to Second Fork	Pa.	CWF	12.9			12.9	nd	
Larrys Creek	Second Fork to mouth	Pa.	WWF	10.0			10.0	1983	
Mosquito Creek	Source to mouth	Pa.	CWF	12.0			12.0	1983	
Lycoming Creek	Source to Long Run	Pa.	CWF	18.9			18.9	nd	
Lycoming Creek	Long Run to mouth	Pa.	WWF	18.0			18.0	1983	
Roaring Branch	Source to mouth	Pa.	HQ-CWF	9.3			9.3	nd	
Red Run	Source to mouth	Pa.	HQ-CWF			3.0	3.0	nd	Acid mine drainage

TABLE 6 (continued) - STREAM CLASSIFICATIONS - WEST BRANCH SUBBASIN (Subbasin 5)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Rock Run	Source to mouth	Pa.	HQ-CWF	12.4			12.4	nd	
Pleasant Stream	Source to mouth	Pa.	HQ-CWF	13.4			13.4	nd	
Steam Valley Run	Source to mouth	Pa.	HQ-CWF	2.7			2.7	1985	
Loyalsock Creek	Source to Lycoming/Sullivan county line	Pa.	CWF	14.1		25.0	39.1	1983	Acid mine drainage
Loyalsock Creek	Lycoming/Sullivan county line to mouth	Pa.	TSF	23.9			23.9	1983	
Little Loyalsock Creek	Source to mouth	Pa.	CWF	19.2			19.2	nd	
Elk Creek	Source to mouth	Pa.	HQ-CWF	11.3			11.3	nd	
Wallis Run/Left Branch	Source to mouth	Pa.	HQ-CWF	13.9			13.9	nd	
Muncy Creek	Source to Muncy Valley	Pa.	CWF	11.6			11.6	nd	
Muncy Creek	Muncy Valley to mouth	Pa.	TSF	24.0			24.0	1983	
The Outlet	Source to mouth	Pa.	HQ-CWF	3.5			3.5	1984	
Mackeys Run	Source to mouth	Pa.	HQ-CWF	1.0	0.5		1.5	1984	pH
Little Muncy Creek	Source to mouth	Pa.	CWF	23.4			23.4	nd	
White Deer Hole Creek	Source to Spring Creek	Pa.	CWF	15.5			15.5	nd	
White Deer Hole Creek	Spring Creek to mouth	Pa.	TSF	5.0			5.0	1983	
White Deer Creek	Source to mouth	Pa.	HQ-CWF	27.6			27.6	1983	
Buffalo Creek	Source to LR 59042 bridge	Pa.	CWF	19.2			19.2	nd	
Buffalo Creek	LR 59042 bridge to mouth	Pa.	CWF	8.6			8.6	1983	
Spruce Run	Source to mouth	Pa.	HQ-CWF	14.0			14.0	nd	
Chillisquaque Creek	Source to mouth	Pa.	WWF	25.4		2.0	27.4	1983	Dissolved solids

TABLE 6 (continued) - STREAM CLASSIFICATIONS - WEST BRANCH SUBBASIN (Subbasin 5)

SUMMARY

TOTAL MILES ASSESSED	2085.0
MILES ATTAINED	1483.4
MILES PARTIALLY ATTAINED	180.9
MILES NOT ATTAINED	420.7
MILES NOT SWIMMABLE	70.0
MILES NOT FISHABLE	844.9
LAST UPDATE:	January 4, 1988

TABLE 7 - STREAM CLASSIFICATIONS - CHEMUNG RIVER SUBBASIN (Subbasin 6)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Tioga River	Source to Crooked Creek	Pa.	CWF	11.6		30.1	41.7	1984	Acid mine drainage
Tioga River	Crooked Creek to state line	Pa.	WWF		5.1		5.1	1984	Acid mine drainage
Tioga River	State line to mouth	N.Y.	C	13.0			13.0	1984	
Fellows Creek	Source to mouth	Pa.	CWF		5.7		5.7	1984	Natural acidity
Morris Run	Source to mouth	Pa.	CWF			2.4	2.4	1984	Acid mine drainage
Coal Creek	Source to mouth	Pa.	CWF			2.5	2.5	nd	Acid mine drainage
Johnson Creek	Source to mouth	Pa.	CWF		3.4		3.4	1984	Acid mine drainage
Elk Run	Source to mouth	Pa.	CWF	10.7			10.7	nd	
Corey Creek	Source to mouth	Pa.	CWF	9.9			9.9	1984	
Mill Creek	Source to mouth	Pa.	TSF	18.4			18.4	1984	
Elk Run	Source to mouth	Pa.	TSF	10.9			10.9	1984	
Crooked Creek	Source to mouth	Pa.	WWF	24.6			24.6	1984	
Catlin Hollow	Source to mouth	Pa.	TSF	9.2			9.2	1984	
Cowanesque River	Source to North Fork	Pa.	CWF	11.0			11.0	1984	
Cowanesque River	North Fork to Cowanesque Lake	Pa.	WWF	24.4		6.0	30.4	1984	Municipal sewage
Cowanesque River	Cowanesque Lake to state line	Pa.	WWF	1.1			1.1	1984	
Cowanesque River	State line to mouth	N.Y.	C	0.9			0.9	1984	
Troups Creek	Source to state line	N.Y.	C	14.6			14.6	nd	
Troups Creek	State line to mouth	Pa.	CWF	5.2			5.2	1983	
Camp Brook	Source to mouth	NY/Pa	C/WWF	5.7			5.7	1986	
Bill Hess Creek	Source to mouth	NY/Pa	C/WWF	3.8			3.8	1986	
Canisteo River	Seneca St. bridge to bridge 1.0 mile downstream Hornell	N.Y.	D		3.3		3.3	1984	Sedimentation bacteria
Canisteo River	Bridge 1.0 mile downstream Hornell to mouth	N.Y.	C	28.8	9.0		37.8	1984	Sewage and sedimentation

TABLE 7 (continued) - STREAM CLASSIFICATIONS - CHEMUNG RIVER SUBBASIN (Subbasin 6)

NAME	DESCRIPTION	STATE	CLASS	ATTAINED	PART	NOT	TOTAL	SURVEY	CAUSE
Tuscarora Creek	North Branch to mouth	N.Y.	D	6.6			6.6	1984	
Bennett Creek	Purdy Creek to mouth	N.Y.	D	1.6			1.6	1984	
Canacadea Creek	Almond Reservoir to mouth	N.Y.	D		3.2		3.2	1984	Sedimentation
Cohocton River	Cohocton to trib 22	N.Y.	C	20.4			20.4	1984	
Cohocton River	Trib 22 to mouth	N.Y.	C	16.6			16.6	1984	
Meads Creek	Source to mouth	N.Y.	C	16.7			16.7	1984	
Mud Creek	Mill Pond to mouth	N.Y.	C	11.5			11.5	1984	
Five Mile Creek	Mud Lake to mouth	N.Y.	D	11.0			11.0	1984	
Chemung River	Origin to Hoffman Brook	N.Y.	C	18.8			18.8	1984	
Chemung River	Hoffman Creek to Bentley Creek	N.Y.	C		8.0		8.0	1984	Sewage
Chemung River	Bentley Creek to state line	N.Y.	A		7.3		7.3	1987	Sewage
Chemung River	State line to state line	Pa.	WWF	2.1			2.1	1987	
Chemung River	State line to state line	N.Y.	A	2.7			2.7	1984	
Chemung River	State line to mouth	Pa.	WWF	6.9			6.9	1984	
Newtown Creek	Diven Creek to mouth	N.Y.	D			2.8	2.8	1984	Sewage
Seeley Creek	Source to state line	Pa.	CWF	10.1			10.1	1987	
Seeley Creek	State line to Dry Run	N.Y.	C	3.3			3.3	1987	
Seeley Creek	Dry Run to mouth	N.Y.	C	6.8			6.8	1984	
Hammond Creek	Source to mouth	Pa.	CWF	9.3			9.3	nd	
South Creek	State line to mouth	N.Y.	C	10.7			10.7	1984	
Bentley Creek	Source to state line	Pa.	WWF	13.8			13.8	1984	
Bentley Creek	State line to mouth	N.Y.	D	1.5			1.5	1984	

TABLE 7 (continued) - STREAM CLASSIFICATIONS - CHEMUNG RIVER SUBBASIN (Subbasin 6)

SUMMARY

TOTAL MILES ASSESSED	463.0
MILES ATTAINED	374.2
MILES PARTIALLY ATTAINED	45.0
MILES NOT ATTAINED	43.8
MILES NOT SWIMMABLE	36.4
MILES NOT FISHABLE	50.3
LAST UPDATE:	January 4, 1988